THE HOME LIFE OF WILD BIRDS

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The Home Life of Wild Birds





Robin Family

Cock Robin, who stands at the back, has just brought and delivered a load of wild red cherries. His mate, who was brooding at the moment, did not leave the nest, but hopped to one side, and presently returned to her post, where you see her in the picture.

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THE HOME LIFE OF WILD BIRDS



A New Method of the Study and Photography of Birds

BY

FRANCIS HOBART HERRICK

With 141 Original Illustrations from Nature by the Author

G. P. PUTNAM'S SONS
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1902

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TO THE MEMORY

OF

MY FATHER AND MOTHER



COME LET US LIVE WITH THE BIRDS!

PREFACE.

IN studying the habits of wild birds two important problems are at once encountered, that of approach and the control of the position of the nest. My first experiments were made with Redwing Blackbirds and Cedar Waxwings, and I soon perceived that an important principle was involved, which every subsequent experiment tended to confirm. Wishing to test its value as fully as possible, every available nest which came to hand was utilized, without the exercise of choice in regard to species.

The observations were made for the most part in central New Hampshire, in the towns of Northfield and Tilton, and pertain to the common birds of the country.

I am indebted to my sister for many practical and valuable suggestions.

FRANCIS HOBART HERRICK.

WESTERN RESERVE UNIVERSITY,
ADELBERT COLLEGE, CLEVELAND, OHIO, April, 1901.







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INTRODUCTION.

I.

TO describe and illustrate a new means of studying animal behavior, and to record what has been learned by its aid concerning the lives of some of our common birds is the main purpose of this volume. It is a popular study of birds in action and is chiefly concerned with the homes or nests and their occupants.

While the desire has been present to make these pages readable, no effort has been spared to render them accurate. Many of the observations are new; nearly all are original, and every statement of fact is believed to be true as it stands.

The wish to give a human interest to every phase of animal activity is of very ancient origin and has done too much already in spreading the seeds of popular error and superstition concerning animal life and lore. Animals should be studied as animals which they are, and not as human beings which they have never been and are not likely ever to become.

The constant reading of human attributes into the activities of animals is to begin at the wrong end, and is a drag on the progress of accurate knowledge. We should first study the animal as far as possible from its own standpoint, and learn with exactness the facts of its life, taking care not to press analogies farther than the observed facts will warrant. Ignorance of anatomy as well as of physiology, and the desire to find in the doings of animals a marvelous counterpart of human powers of intelligence and reason have already stocked our libraries with fables, anecdotes, and stories, many of which make delightful reading, but possess little value for the modern student.

The first duty of the narrator of natural as well as civil history is to tell the truth, and to the naturalist belongs also the privilege of showing that the lives of the higher animals, when fully and clearly revealed, possess a more vital interest than the puppet dressed in human clothes, however admirable the latter may be as a work of art.

I trust that the reader will not misunderstand these remarks. Is it denied that animals possess intelligence or any powers of reason? Not at all! Such questions depend largely upon our definitions of words, and without fresh observations are usually fruitless of result. What is criticized is the gross anthropomorphism which characterizes much that is written upon the actions of animals. If I am an offender in this direction, I hope it is only in a minor degree. I am anxious to attribute to the animal every power which it is actually known to possess, and look for the roots of human instinct and intel-

ligence all along the line of animal evolution. It tends only to confusion, however, to call those acts of association which lead to acquired habits, instincts, or the countless mechanical or chemical reactions of organisms to external stimuli, the expressions of intelligence and thought. "Go to the ant thou sluggard!" is good advice, but one should bring from the ant a trustworthy account of how it performs its wonderful works. It is important to distinguish the root from the bud, as well as from the perfected flower and fruit.

Although this is not a treatise on animal behavior, a general working theory has been adopted and will now be given. Every animal at birth inherits with its bodily organs the power to use them in a more or less definite way, and all but the lowest animals, of which the Protozoa, jelly-fishes, and possibly the worms may be taken as representatives, acquire some power of learning to do things in the course of their lives. Their equipment thus consists of (1) unlearned or inherited powers, and (2) of learned or acquired abilities, which are the results of experience—often very bitter. The term "instinct" when used in a very broad sense may be given to all inherited or ingrained tendencies, and "habit" reserved for what is acquired or learned through a process of association of certain things with certain acts. An animal's powers thus consist of free gifts at its start in life, and later acquisitions gained through its own efforts in the struggle for existence.

The catalogue of instinctive acts—even in the narrower sense of involving a number of different organs—is surprisingly great in an animal standing so high in the scale as the bird, but examples drawn from a single species will suffice. When the spring comes the young bird, who returns to the place of its birth, is prompted to find a mate, and with her soon begins to build a nest. Though unattended by instructors and unprepared by practice, it uses the inherited tools of its guild—bill, breast, and feet — with a nice precision, and be it Oriole, Robin, Flycatcher, or Vireo, follows with wonderful closeness the type of architecture which its ancestors have used for ages.

Why does the Robin in its first attempt at nest-building begin by laying a foundation of dry grass or stubble, and add to this mud softened with water and made into a mortar, which it then heaps about its breast and molds into a symmetrical cup, often selecting a rainy day for the work? One might as well ask why the Robin lays blue eggs, or why it utters its well known call. It acts in these ways because it must, because Robins have been doing these things for hundreds of generations. It not only inherits tools, but a certain aptitude for their use. Its organization compels or determines its actions.

No learning of such initial actions is required or even possible since all this has been attended to, as one might say, centuries before the animal was born. These instinctive responses are spontaneous, and when the right button is pressed or the right stimulus applied from without or within, the reaction follows as a matter of course. Of course the Robin must make a mortar of mud and straw; of course it must lay blue eggs, and after incubating them, carefully rear and feed its young. To do otherwise would not only be absurd, but very uncomfortable. Had its ancestors been Cowbirds it would have made no nest at all, but filched another's, and foisting its eggs upon some simple minded nurse, shirked the duties of parents to their offspring. The Cowbird was thus very early to enter the field of experimental psychology.

Every bird must follow the laws of its nature, and its inherited instincts are no more wonderful than its inherited organs,—its vocal cords, its keen eyes, and its marvelous feathers.

The higher animals thus start in life with a definite equipment,—a body tuned to respond to the world in which they are placed, and this ingrained ability for action may be called instinct.

In speaking of the "habits" of animals we usually mean the manner of their life in general, while a "habit" in the technical sense may be regarded as a mode of action which the animal has learned or acquired. It is associated with pleasure, and in the course of repetition may become more or less fixed or "stereotyped." In this sense habits are formed out of the raw material which heredity provides. The young bird learns to eat certain things, to avoid certain enemies, to start at certain sounds, to ignore others, to approach its nest in a certain way. Thus also the vertebrate sometimes acquires the habit of walking backward, while its instinct leads it to walk forward.

Habits must in time take the place of instincts in a very large measure, and it would not be strange if a Robin's second nest were more nearly perfect than its first, or if the third were better than the second, but this would also depend upon other conditions.

The power of forming habits is a sign of intelligence, but not necessarily of reason. The intelligence may be a small grain and never destined to grow into a flourishing tree of knowledge, but it must exist along with the power of profiting by experience.

The mental faculties of birds seem to exhibit a wide range of gradation from excessive stupidity to a fair degree of intelligence, with strong associative powers,—rarely if ever the association of ideas, but of things with actions,—and often with wonderful powers of imitation.

The habits acquired by one generation are probably never handed on to the next, but this is a subject from which the dust of argument has not yet cleared away.

II.

That a bird in the hand is worth two in the bush may be a good motto for the anatomist or epicure, but for the observer of living animals a bird within reach of the hand and still in the bush is of far greater worth. The problem is how to see and not be seen. If a bird is actually caught and kept in a cage or put under restraint in any way, its behavior is no longer perfectly natural and free, at least not until all fear has been subdued and it is no longer wild but tame. What is needed is an invisible chain which shall hold the animals to some fixed and chosen spot which can then be approached in disguise.

Fortunately for the student of bird-habit and instinct all these conditions are fulfilled for a most important and interesting period,—that of life at the nest. The nest is the given fixed point, and parental instinct is the invisible chain. The wild bird, however, is bound not merely to the nest, but to its young. Wherever the young go, the old birds follow. By using the nearly fledged young as a lure, some species could, I believe, be led across country for a mile or more. I have taken them two hundred feet without special effort.

Hitherto the bird-photographer has had to rely mainly upon chance in getting a picture of the nesting scenes. Most land birds depend upon concealment for protection from their enemies during the season of young. Their nests are apt to be shrouded

in grass or foliage, and, if easily approached, are usually inaccessible to the camera. If the nest is in a high bush or tree, the difficulties of the position and light are usually an effectual bar to obtaining good pictures, to say nothing of seeing what takes place. When the nest is on or near the ground and in a well-lighted spot, conditions which are only rarely fulfilled, it has been customary to set up the camera, and attaching a long rubber tube or thread to the shutter, to retire to a distance and wait for the birds to appear. When one of them is seen to go to the nest, the plate is exposed by pulling the thread or pressing the pneumatic bulb, and, if in luck, a picture may thus be obtained. Many plates, however, are sure to be spoiled; little can be seen, and the observer has no control over the course of events. In the pages which follow, a method is described by which nesting birds can, in many cases, be successfully approached and studied with ease whatever the position of the nest.

It is a comparatively easy matter to examine and photograph the nest, the eggs, or the young of such species whose dwellings are accessible to all, but to portray the free behavior of the adult bird of the shy land species is quite another question.

The method is limited in its application from the necessities of the case. It is based on the solid ground of animal instinct, and may confidently be expected to have a wide application; but how wide or general its use may become can only be determined by well-directed experiment.

III.

Nearly all the illustrations of this volume are from photographs of adult land birds, and the reader will observe that they are in many cases arranged in series, and portray certain actions which are performed in a kind of routine. With very few exceptions all were made by means of the method, that is to say, the photographs were taken deliberately and not by chance. My plan was to watch the life at the nest very closely, hour by hour, and day by day, and I often made a large number of photographs to illustrate typical and unusual scenes at a nest. The observer has the advantage of being on the spot, of being able to see every act performed and to seize every opportunity which may arise. Many of the photographs here shown could not have been obtained by any other means.

What is offered now represents but à beginning in the attempt to portray the whole life of birds at the nest. The first furrow only has been struck in an old and still fallow field. These pictures will possibly seem crude when compared with those which the future will yield, but there is this to be said about all really good photographs of wild animals, that they possess a permanent interest and value, since within their limits they represent the truth, vigor, and freshness of nature. When this method comes to be applied to some of the water birds, the Terns, Gulls, and their congeners along the coast, which are more easily approached than the shyer land species, serial pictures will be obtained of far greater perfection and beauty than anything which has yet appeared.

For the portrayal of animals in action the camera is of supreme value, and if I have emphasized its use, it is only as a means to an end. Scientific books dealing with the anatomy and development of animals will always require good drawings for the illustra-

tion of their subjects, and these are preferable to poor photographs, but for the study of animal behavior in both the invertebrates and vertebrates the camera is immeasurably superior to brush or pencil. Popular natural history books have already a large body of invaluable material to draw upon for illustrative purposes, and the often crude, impossible, or imperfect drawings, which have so long done service in the past, will gradually give place to truthful delineations of animals at home, and in the midst of that nature of which they form a part.





THE HOME LIFE OF WILD BIRDS.

CHAPTER I.

A NEW METHOD OF BIRD STUDY AND PHOTOGRAPHY.

THE method of studying the habits of wild birds which this volume illustrates consists in bringing the birds to you and then camping beside them, in watching their behavior at arm's length and in recording with the camera their varied activities. By means of such a method one may live with the birds for days at a time, and watch the play of their most interesting habits and instincts. The actors are not confined in cages; they suffer indeed no restraint, excepting that only which their nature imposes. They come and go at will, and their life is as free and untrammeled as ever.

The method enables one to see with his own eyes at a distance of a few inches or feet, more or less, what birds do in and about their nests, and at the same time affords the rare opportunity of making photographs, not a single picture or a chance shot now and then, but an unlimited series of pictures to illustrate the behavior of birds in the fullest manner and at the most interesting period of their lives. It is often an easy matter to focus your camera directly upon the bird itself and to give a time exposure when desired. Moreover, you can approach as near as you wish, and make photographs of any required size.

I will now give the reader a less enigmatical account of the method, first considering its psychological basis or the scientific principles on which it rests, and then recording in a separate chapter, as practical examples of its working, the exact history of a few of the cases in which it has been applied.

The method in use depends mainly upon two conditions:

(1) The control of the nesting site, and

(2) The concealment of the observer.

Control of the Nesting Site.

By nesting site is meant the nest and its immediate surroundings, such as a twig, branch, hollow trunk, stem, or whatever part of a tree the nest may occupy, a bush, stub, strip of sod, or tussock of sedge, that is — the nest with its immediate settings. If the nest, like that of an Oriole, is fastened to the leafy branch of a tree, the nesting bough is cut off, and the whole is then carefully lowered to the ground and set up in a good light, so that the branch with the nest shall occupy the same relative positions which they did before. The nest, however, is now but four instead of forty or more feet from the ground.

The nesting bough is carried to a convenient distance from the tree, and firmly fastened to two stakes, driven into the ground and placed in a good light. If the nest is in a tussock in a shaded swamp, the whole is cut out and taken to the nearest well-lighted place; if in the woods, it is carried to a clearing where the light is favorable for study. Again, when a nest like that of the Brown Thrush occupies the center of a dense thorn bush which no human eye can penetrate and much less that of the camera, its main supports are cut off, and the essential parts are removed to the outside of the clump or to any favorable point close at hand. If the nest is but five or ten feet up, the main stem is severed, and the nesting branch lowered to the four-foot mark, a convenient working height.



Fig. 1. Tent in front of Cedar-bird's nest, shown in its original position in Fig. 12. One of the birds is feeding its young.

I wish to emphasize the fact that the nest itself is usually not moved or disturbed, or rather that it is moved only with its supports. The change is one of space relations, which may change with every passing breeze, but the relation of nest to support remains undisturbed.

This sudden displacement of the nesting bough is of no special importance to either old or young, provided certain precautions are taken to be dwelt upon a little later. It is as if an apartment or living room were removed from the fourth story of some human abode to the ground floor, or in the case of the ground building birds as if the first story were raised to a level with the second. The *immediate* surroundings of the nest remain the same in any case. The nest might indeed be taken from its bough or from the sward, but this would be inadvisable, chiefly because it would destroy the natural site or the exact conditions selected and in some measure determined by the birds themselves.

For an observatory I have adopted a green tent which effectually conceals the student together with his camera and entire outfit. The reader will find this fully described in the chapter on the tools of the bird-photographer. The tent is pitched beside the nest, and when in operation, is open only at one point, marked by a small square window, in line with the photographic lens and the nest.

Concealment of the Observer.

It seems at first thought strange and almost incredible that one may take such liberties with wild birds, without wreaking destruction upon the young or introducing such unnatural conditions as would be intolerable to every true student and lover of birds, but this is by no means the case. No injury is wrought upon old or young. The former nesting conditions are soon forgotten, while the new are quickly adopted and defended with all the boldness and persistence of which birds are capable.

Principles which underlie the Method.

This method of studying birds depends mainly upon the strength of the parental instincts which bind old to young by an invisible chain, and upon the ease with which a bird learns to adapt itself to new conditions. Upon more complete analysis we recognize the following psychological principles:

(a) The strength of an instinct increases through exercise, and may be reënforced by habit;

(b) An instinctive impulse may be blocked or suppressed by any contrary impulse;

(c) The instinct of fear is often temporarily suppressed by the fighting instinct, or permanently overcome by the repetition of any experience leading to the formation of new habits or associations.

We may also add:

(d) New habits are readily formed and reënforce or supplant those of older growth;

(e) Abstract ideas, if they form any part of the furniture of the average bird-mind, are extremely hazy and fleeting;

(f) Finally we must recall the physiological fact that birds are guided in most of their operations by sight and hearing, not by scent. Their olfactory organ is very rudimentary at best, and avails them neither in finding food, nor in avoiding enemies.

After a brief analysis of the parental instincts we will endeavor to show how the principles just given are applied to the problem of approaching wild birds in the way described.

The parental instincts begin to control the life of the adult with the periodic revival of the reproductive functions, and vary greatly in their scope and intensity at the different stages of their reign as well as in different species of birds. They are periodic, recurring at definite intervals during sexual life and in serial form, one kind of act usually leading to the next in sequence, and so on until the series is complete.

When more than one litter is produced in a season, the series of events is repeated with minor changes If we include the typical migratory movements, the principal terms of the reproductive cycle may be expressed more fully as follows:

(1) Spring migration of the summer residents to the place of birth;
(2) Mating;
(3) Selection of nesting site and construction of the nest;
(4) Egg-laying;
(5) Incubation;
(6) Care of the young in the nest, including feeding, and cleaning nest and young;
(7) Care and education of young from time of flight;
(8) Fall migration to winter quarters.

Birds seem to follow one line of conduct, whether it be sitting over the eggs, brooding, or tending the young, until their instinct in that particular direction has been satisfied,

thus normally completing one term of the series before passing to the next in sequence. The machinery, however, rarely works with absolute precision. Perturbations are sure to arise whenever a contrary impulse comes into the field, and either blocks the path or struggles for supremacy.



Fig. 2. Tent in bushy pasture beside nest of Chestnut-sided Warbler, shown in detail in Fig. 3.

The surge of parental feeling is often marked by an inbred pugnacity, which begins to show itself in certain species at the very beginning of the breeding season. This fighting mood, which is an adaptation for the protection of the home and all that it contains, is by no means a measure of the other parental impulses. It has a gradual rise, reaches a maximum when the young are ready to leave the nest, at a time when protection is most needed, and then gradually subsides.

When a pair are robbed during the breeding season, or in any way disturbed in mind or property, three courses are open to them, either to desert and begin operations anew, to stay by the nest and save what is left, or, having done this, to fill up the gap by laying more eggs. The course eventually followed depends upon the nature of the bird, or upon the relative strength of fear, the parental instincts, and habit.

The parental instinct,[1] reënforced by habit, gradually increases until the young are reared. It is therefore safest to change the nesting surroundings when this instinct is approaching its culmination.

The general feeling of fear is gradually or quickly suppressed according to the value of the different factors in the equation, by the parental instinct, which impels a bird at all hazards to go to its young wherever placed. This impulse though it be weak at first, is strengthened by exercise, or what amounts to the same thing,—by the growth of habits or associations.

After a bird once visits the nest in its new position, it returns again and again, and in proportion as its visits to the old nesting place diminish and finally cease, its approaches to the new position become more frequent, until a new habit has been formed, or if you will, until the old habit is reinstated.

When the birds approach the nest any strange objects like the stakes which support the bough, or the tent which is pitched beside it arouse their sense of fear or suspicion,

[1] This phrase is sometimes used for the sake of brevity and convenience in nearly the same sense as parental attachment or parental love.

and they may keep away for a time or advance with caution. If very shy, like most Catbirds, they will sometimes skirmish about the tent for two hours or more before touching the nest. The ice is usually broken however in from twenty minutes to an hour, and I have known a Chipping Sparrow and Red-eyed Vireo to feed their young in three minutes after the tent was in place.



Fig. 3. Tent beside nest of Chestnut-sided Warbler. The female broods, while the male is foraging.

At every approach to the nest in its new position, the birds see the same objects which work them no ill. The tent stands silent and motionless, unless it happens to be windy, but the young are close by, and fear of the new objects gradually wears away. Parental instinct, or in this case maternal love, for the instinct to cherish the young is usually stronger in the mother, wins the day. The mother bird comes to the nest and feeds her clamoring brood. The spell is broken; she comes again. The male also approaches, and their visits are thereafter repeated.

Possibly the fears of the old birds are renewed at sight of the window which is now opened in the tent-front, and of the glass eye of the camera gleaming through it, but the lens is also silent and motionless, and soon becomes a familiar object to be finally disregarded. Again there is the fear which the sound of the shutter, a sharp metallic *click*, at first inspires, unless you are the fortunate possessor of an absolutely silent and rapid shutter, an instrument which is unknown to the trade, at least in this country. At its first report when two feet away, many a bird will jump as if shot, give an angry scream, and even fly at the tent as if to exorcise an evil spirit, while after a few hours, or on the second day, they will only wince; finally they will not budge a feather at this or any other often repeated sound, whether from shutter, steam whistle, locomotive, or the human voice. This illustrates the effect of the alarm clock over again. At our first experience with this nerve-wracking machine, we start from deep sleep and promptly heed its summons; then we are apt to mind it less and less until we sleep on serenely in spite of it. If we were to place an alarm clock on or near the nesting bough, and let it off at regular but not too frequent intervals, the birds would soon learn to disregard it as we do, and as some of them disregard the babel of a city street.

It is the young, *the young*, always THE YOUNG in whom the interest of the old birds is centered, and about whom their lives revolve. They are the strong lure, the talisman, the magnet to which the parent is irresistibly drawn. The tree, the branch, the nest itself, what are these in comparison with the young for whom alone they exist?

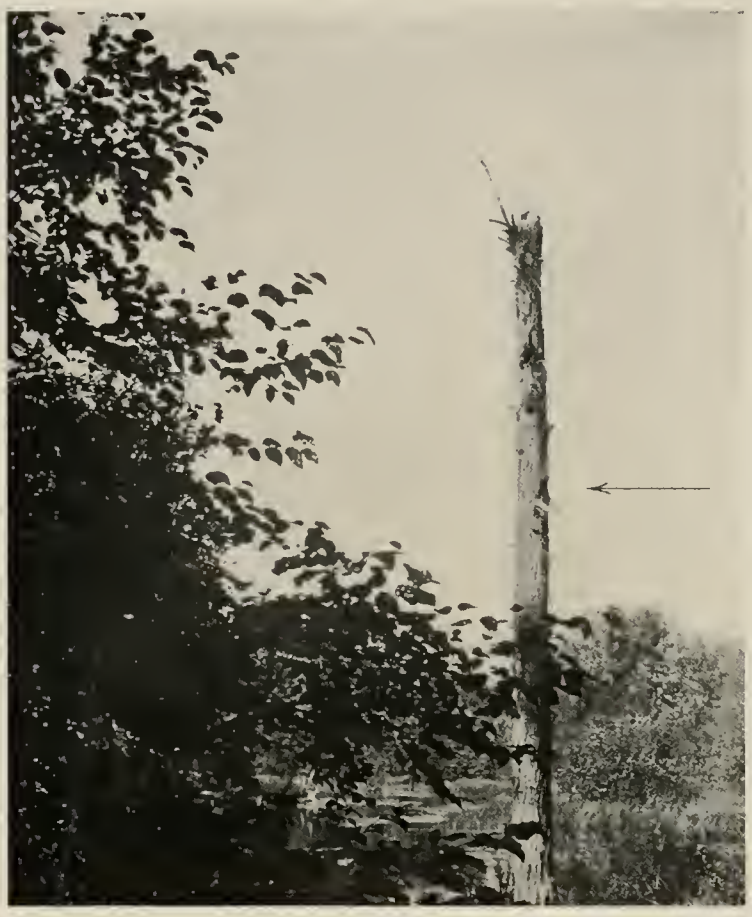


Fig. 4. Truncated elm with nest-holes of Woodpecker, the lowermost recently occupied by Bluebirds. To bring down the nest, the trunk may be cut from below or in line with arrow.

When to Change the Nesting Site.

With some species it is possible to make the necessary change without evil consequences when there are eggs in the nest; with others we must wait until the young are from four to nine days old. It is all a question of the strength of the parental instinct, and this varies between wide limits in different species, and very considerably between different individuals. From the nature of the case there can be no infallible rule. If we know little of the habits of the birds in question it is safest to wait until the seventh to the ninth day after the young are hatched, or when in many passerine birds, as Robins, Orioles, and Waxwings, the feather-shafts of the wing-quills begin to appear in the young, or better when they project from one quarter to one half inch beyond the feather tubes. At this period the parental instinct is reaching its maximum, and, what is equally important, the sense of fear has not appeared in the young.

When we try to formulate a rule, however, we at once encounter numerous exceptions. Thus in Cuckoos the feathers do not shed their envelopes gradually as in most birds, but remain sheathed up to the last day in the nest. Of greater importance is the understanding of the principles involved, and with these in mind and judiciously applied very few mistakes should be made.

At the beginning of observations a nest with eggs should be watched, but not disturbed. When the period of incubation has been determined, and the time of hatching

known, the young may be examined and photographed if it is desired. At all events they should be watched until the critical time arises for closer study. This decided upon in the manner already suggested, circumstances must determine the course to be followed.

Mode of Procedure.

If the nest, like that of a Robin or Kingbird, is saddled to the branch of a tree, saw off the whole limb and nail it to stakes driven into the ground, so placed as always to give the best light. The nesting bough, in case there is one, should be set with its long axis parallel with the course of the sun, but the position of the bough or tent may be changed during the day when exceptional conditions render it necessary.

Either a dark foliage or a sky background may be chosen for the nest, according to the desire of the operator or the possibilities of the situation. If not satisfied with a natural background it would be possible to place dark or light screens behind the nesting bough or to use reflected light for softening the shadows, but no experiments have yet been made in this direction. The tent is then to be placed in position, or it may be pitched and left overnight beside the nest.[1] In other words, operations may begin at once or be postponed until the following day, the better plan for a beginner until he has mastered minor difficulties, which, though small in themselves, are far from unimportant. When the tent is closed absolute silence must be maintained, for while this is not always necessary, it is the best rule to follow during the first days of observation.



Fig. 5. Nest-hole of Flicker, used by Bluebird. Trunk removed from tree, and mounted on pivot so that it can be turned to any angle with sun. See No. 15 of table, p. 12, Fig. 10, and Chapter VII.

The best time to begin is from eight to nine o'clock in the morning, because the young will then have been fed, and the sun will be getting high enough for the most rapid photographic work. One may spend as many hours a day, and as many days at one nest, as time permits or inclination decides.

[1] Directions for use of the tent are given in Chapter III.

I will only suggest that the second day is always better than the first, and that the third or fourth is always sure to bring something new. If one would learn the nesting habits of any species thoroughly, it will hardly do to rely upon one nest. The more you see of different nests and different birds the better.

I usually spend five or six hours in the tent, from nine in the morning until three in the afternoon, when the weather is fine. If the camping ground is near my house, as it usually is, I leave the tent for half an hour at noon, but if it is far, I carry a lunch and spend the day. When possible, I am always on hand during the last day of life at the nest, to see the young leave it, usually one at a time, and to witness the manœuvres of the parents in conducting them to the nearest trees.



Fig. 6. Nesting bough of Kingbird removed from apple tree in background at a point where extended arrows meet, and fixed to upright stakes. Tent-cloth thrown over frame which is set in position.

Precautions to be Observed.

Young birds from one to five days old cannot, as a rule, stand excessive heat. Even when fed and brooded they will sometimes succumb, and here lies the serious danger to be guarded against. A nest of very young birds well shaded by foliage cannot be safely carried into the direct sunshine of a hot summer's day, hence the importance of beginning operations at the proper time when the weather is suitable, and further of not allowing your enthusiasm to get the better of your judgment.

The morning of a clear, mild day is preferable, but since we cannot order the weather, it is better to leave the birds to themselves, if it promises to be excessively hot or windy.

The young may be fed or handled as much as one wishes, provided they have not acquired the instinct of fear. If you are uncertain as to this and your aim is to study the nesting habits, it is better to avoid approaching, touching, or in any way disturbing the young after the flight feathers have appeared. The cutting of leaves or twigs which obstruct the light or cast undesirable shadows should be done before this time.

On the other hand, investigations of the young which require accurate weighing,



Fig. 7. Female Kingbird astride nest, protecting young from heat. This and the following from photographs made at nest shown on facing page.



Fig. 8. Kingbird family. The male with grasshopper in bill,—his mate, partly hidden, behind him.

measurements, or photographs of the birds themselves, place the matter in a different light. With these objects in view the nest must be frequently approached and the young taken out, and for such studies the change of the nesting site offers such obvious advantages that it is needless to dwell upon them. In taking down the nesting bough it is often necessary to touch the nest, and this does no harm.

Young birds eight or nine days old stand the heat well, provided they are fed, but on very hot days they should not be allowed to go without food for more than two hours at the longest. Should the parents bring no food during this time, it is better to feed the young in the nest, and to suspend operations until the next day.

As has been already said, the old birds may be expected to come to the nest in from twenty minutes to an hour, when the tent is brought into immediate use after removal of the nesting bough. It is naturally impossible to predict exactly what will happen in any given case until the experiment is tried, since the personal equation or individuality of the birds themselves is an unknown and variable factor. One thing only is certain, that the parental instincts, reënforced by habit, will win in the end, that they will cast out fear, and draw the birds to their young.



Fig. 9. Cedar-bird at nest shown in Figs. 1, 12, and 13, prepared to feed young by regurgitation: a characteristic attitude. The parallel outlines of the neck show that the gullet is full.

Extent of Application of the Method.

I have used the tent and altered the nesting site in the case of twenty-six nests belonging to fifteen different species of birds. The experiments were made in the course of two seasons, and the entire list is tabulated as follows, the age of the young in most cases being only approximately accurate :—

EXPERIMENTS IN THE USE OF THE OBSERVATION TENT AND IN CHANGE OF NESTING SITE.

	Birds and Nests.	Time.	Number of Young.	Age of Young.
1	Redwing Blackbird (Nest undisturbed)	July 14, 1899	3	11 days.
2	Redwing Blackbird (Nest swayed down one foot)	July 19, 1900	3	5 days.
3	Catbird (Nest undisturbed)	July 23, 1899	2	8 days.
4	Catbird (Position of nest unchanged)	July 26, 1899	3	3–4 days.
5	Catbird (Nesting bough displaced ten feet)	Aug. 4, 1899	3	7–8 days.
6	Catbird (Nest undisturbed)	June 21, 1900	4	7 days.
7	Cedar-bird (Nesting bush moved twenty feet)	Aug. 3, 1899	4	9–10 days.
8	Cedar-bird (Nesting bough displaced forty feet)	Aug. 21, 1899	4	6 days.
9	Cedar-bird (Nesting bough cut off and moved fifty feet)	Aug. 23, 1899	2	10 days.
10	Cedar-bird (Nest in pine tree; bough moved fifty feet)	July 14, 1900	4	7–8 days.
11	Red-eyed Vireo (Nesting twig lowered one foot)	Aug. 3, 1899	2	8 days.
12	Red-eyed Vireo (Nesting tree cut down and taken from woods forty feet to open)	July 5, 1900	4	9 days.
13	Robin (Nesting bough cut off and moved thirty feet)	Aug. 9, 1899	3	7 days.
14	Robin (Nest in oak thirty feet up; branch moved to open field sixty feet away)	July 25, 1900	3	6 days.
15	Bluebird (Nest-hole in apple tree; moved fifty feet to open field)	Aug. 15, 1899	4	5 days.
16	Chestnut-sided Warbler (Bushes cleared in front of nest)	June 15, 1900	4 eggs	
17	Chestnut-sided Warbler (Bushes cleared in front of nest)	June 28, 1900	4	4 days.
18	Night Hawk (Nesting site with young enclosed with wattled twigs)	June 29, 1900	1	5 days.
19	Baltimore Oriole (Nesting branch in apple tree; moved twenty-five feet)	June 25, 1900	3	8–9 days.
20	Kingbird (Nesting branch moved twenty feet)	July 2, 1900	2	6 days.
21	Kingbird (Nesting branch moved twenty-five feet)	July 2, 1900	4	7 days.
22	Wilson's Thrush (Nest in tussock; whole moved from swamp to open fifty feet)	July 9, 1900	3	10 days.
23	Chipping Sparrow (Nesting bough moved twenty feet)	July 11, 1900	4	4–5 days.
24	Brown Thrush (Nest in thorn bush; moved fifteen feet)	July 11, 1900	3	4 days.
25	Song Sparrow (Nest in dead sapling; moved forty feet to open)	July 17, 1900	3	5 days.
26	Kingfisher (Nest in bank; opened at rear)	July 23, 1900	5	9 days.

In only three cases where the nest with its supports was moved did the young suffer, and in each of these from unusual conditions. A nest of Cedar Waxwings (8) though fed by both birds and brooded almost constantly, succumbed to the heat, the day being one of the hardest of the entire summer. The second, a nest of Bluebirds (15), were constantly fed during the day while I watched them, but the old birds were frightened off at some later time, and their young left to perish. The third, a nest of Song Sparrows (25), also came to grief on account of the heat. The day was the hottest ever recorded by the Weather Bureau in New England, and the nest, which was moved to the open, happened to be in the crotch of a dead sapling, so that the birds were exposed on all sides.

In one or two instances I had serious trouble from cutting away too much foliage about a nest in very hot weather, but such accidents are really needless, if one follows the rule of leaving the birds to their own devices on days of excessive heat and humidity. In all the other cases, everything went well, and the young left the nest in due course.

Kingbirds have remained in the nest eleven days after the change, Robins a week, Cedar-birds six days. A glance at the table will show that in one instance, that of the Chestnut-sided Warbler (16), observations were begun while there were eggs, and I have no doubt that in many species the whole period of life in the nest from hatching to the time of flight may be watched from the tent, but the subject is yet open to experiment. It is all a question of the strength of the parental instincts at the period in question. Where this attachment to nest and eggs is strong as in Owls, Fish Hawks, Flickers, Kingbirds, and the Chipping Sparrows, to mention a few cases, we may look for success.



Fig. 10. Female Bluebird with cricket in bill, ready to enter nest-hole. See Fig. 5.

I am confident that the movable tent has a great future as an observatory for the study of bird-habit, and that it will be possible to watch the building of the nest in such species as have a strong attachment to chosen sites, and whose plans are not easily disturbed by trifles. Here is certainly a fallow field which has been scratched only here and there by the plow, and where attempts to cultivate it fail, no harm is done. In making experiments in this direction care should be taken not to approach too near with the tent, at least on the first day. Again it is probable that many kinds of birds may be attracted by food and other lures, but the possible rewards of sedentary experiments in this direction are too uncertain to arouse much enthusiasm in the mind of the active bird student.

I have no desire to anticipate every objection which might be raised against the method, were it possible to do so, but after testing it to the best of my ability with the opportunities of two summers, I am confident of its value and am ready to stand sponsor for it in judicious hands. It is hardly necessary to insist that it is not designed for exhibition purposes, and that its successful practice requires some knowledge, with more patience and time.

Objections to the Method.

To the trained naturalist patience has long ceased to be a virtue. He is accustomed

to work in the field or laboratory for weeks or months to attain a well-defined end, and that end he will attain, provided it can be compassed by intelligence, industry, and skill. Patience is the naturalist's stock in trade, and while no success may come because of it alone, none can be assured without it.



Fig. 11. Female Chestnut-sided Warbler shielding the young on a warm day. Photographed from tent shown in Figs. 2 and 3.

In the ten days or two weeks or more of life at the nest events move rapidly and the question of time is important. Any interruptions are therefore opportunities for the display of patience rather than for the increase of knowledge.

We have already seen that the displacement of the nest or nesting branch does not introduce unnatural conditions of any importance into the life of the birds. Of course every change wrought by man is in a certain sense unnatural. If we pluck a single leaf from a tree, that tree is no longer in its natural state, but the change counts for nothing. If we keep on plucking leaves, however, a time will come when the arm of the balance is disturbed, and the denuded tree is sure to suffer. The removal of a leaf or twig about a nest is of no practical consequence, but this should not be carried too far, both on account of the young which need the protection of shade, and for the sake of natural appearances which we wish to preserve.

It might be supposed that when a branch is lopped off, its foliage would at once wither, and unduly expose the nest or detract from the artistic value of a picture. The fact is, however, that there is commonly enough sap in a hard wood bough of moderate size to keep the leaves fresh for several days,[1] and towards the close of life at the nest the

[1] When the nesting branch is vertical and not too large, it can be easily kept fresh by placing it in a jug or can of water which should be set in the ground.

young need no protection from this source. As to this point, however, the illustrations in this book will speak for themselves.

Evergreens like the pine and spruce hold their leaves bright for a long time after cutting, and in this respect the various deciduous trees and shrubs differ greatly, those with a hard, close grain keeping fresh the longer.

As to any injury to trees which the method may be supposed to entail, it is not worth considering, since no valuable tree should be mutilated without first obtaining the permission of the owner, for however trifling the damage may appear, his point of view is likely to be different from your own. The cutting of an occasional twig or branch, even if it does not trim the tree, is not regarded as an important event in this country at present. If every farmer who owns orchards and woodlands did his duty, he would cut out more useless wood in a year than a student of birds would need to do in a decade. It is possibly unnecessary to add that no one should set up a nest in a field, and leave the trouble of removing it to the owner of the land.

A more serious objection is likely to occur to the ornithologist, namely the liability of exposing the birds to new enemies. I feared lest prowling cats should discover the young ones whose nest and branch had been brought down from the tree top, and set up again in plain sight within easy reach from the ground, but I was happily mistaken. Predacious animals of all kinds seem to avoid such nests as if they were new devices to entrap or slay them.

As to the weather, barring heat which must be guarded against in the way described, the nesting bough is more secure when fixed firmly to supports than it could possibly have been before. The only depredator of whom I stand in fear is the irresponsible or malicious small boy, and to anticipate his possibilities for evil, I take a look at the nest now and then when not encamped beside it.

When the nest is completely exposed and the weather is very hot, the young may be tempted to forsake it a day or two earlier than they would naturally do, but this does not usually happen and is not necessarily serious. Some Kingbirds, already referred to, spent eighteen days in the nest, and were a week old when it was moved. This was probably longer than common, and certainly longer than necessary.

The tent not only conceals the observer but protects his camera, an important consideration, since the prolonged action of the sun is liable to spring a leak in the bellows. As to the portability and general convenience of the tent I shall speak elsewhere.

Advantages of the Method.

With notebook in hand you can sit in your tent, and see and record everything which transpires at the nest, the mode of approach, the kind of food brought, the varied activities of the old and young, the visits of intruders, and their combats with the owners of the nest, the capture of prey which sometimes goes on under your eye. No better position could be chosen for hearing the songs, responsive calls, and alarm notes of the birds. You can thus gather materials for an exact and minute history of life at the nest, and of the behavior of birds during this important period. More than this, you can photograph the birds at will, under the most perfect conditions, recording what no naturalist has ever seen, and what no artist could ever hope to portray. The birds come and go close to your eye, but unconscious of being observed.

I have watched the Night Hawk feed her chick with fireflies barely fifteen inches

from my hand, the Kingfisher carrying live fish to its brood whose muffled rattles issued from their subterranean gallery a few feet away. When near enough to count her respirations accurately, I have seen the Redwing Blackbird leave her nest on a hot day, hop down to the cool water of the swamp, and after taking a sip, bathe in full view, within reach of the hand; then, shaking the water from her plumage, she would return refreshed to the nest. I have seen the male Kingbird come to his nesting bough with feathers drenched from his midday bath in the river, the Orioles flash their brilliant colors all day long before the eye, and Chestnut-sided Warblers become so tame after several days that the female would allow you to approach and stroke her back with the hand.

It is difficult to describe the fascination which this method of study affords the student of animal life. New discoveries, or unexpected sights wait on the minutes, for while there is a well-ordered routine in the actions of many birds the most charming pictures occur at odd moments, and there is an endless variety of detail. It is like a succession of scenes in a drama, only this is real life, not an imitation, and there is no need of introducing tragedy.

He who runs may sometimes read and observe a few things, and so may he who performs gymnastic feats in the branches of tall trees or does penance in a hundred other ways, but from the tent one may read the life of the nesting bird as out of an open book.

CHAPTER II.

ILLUSTRATIONS OF THE METHOD.

IT is always interesting to see how birds actually behave when put to the test, and as illustrations of the method applied I have selected four common birds, the Cedar Waxwing, the Baltimore Oriole, the Redwing Blackbird, and the Kingbird. The choice might have fallen, however, upon any others in my list, for the principles are in every case the same.

Since the breeding habits of these birds will be described more fully at a later time, the change of their nesting site and their behavior in the face of new surroundings need only concern us for the present.

On the third day of July a Cedar-bird's nest (No. 10 of table on page 12) was discovered in an unusually attractive situation. It was fastened to the horizontal branch of a white pine about fifteen feet up, in the line of an old stone wall that bounded an open field. In passing beneath the tree almost daily during the following week, I was sure to find one of the old birds, the female as I supposed, always on the nest and sitting in the same alert attitude, engaged either in incubation or brooding. With upstretched neck she would sit motionless and silent as a statue, as if listening intently, her dark eye shining like a jet black bead against the background of pine needles. I was waiting for the propitious time to move this nest to the open field. This time arrived on July 14th, when the heads of the young began to appear over the rim of their nest. The bough was then sawn off, carried fifty feet from the tree, and set up in the newly mown field, in an east to west line at a height of four feet from the ground, and in such a way that the birds could be "skyed," and the light would be good from nine o'clock in the morning until three in the afternoon. The tent was then pitched and closed; the whole operation lasted longer than usual owing to some difficulty in getting stakes of the right height. Fifteen minutes is usually long enough for this work.

The Cedar-bird.

From peep holes the old birds could be seen in the nesting tree, and you began to hear their faint *z-e-e-e-e-e-e-t*, in response to calls from the young. In twenty-four minutes the female was on the bough and fed her brood with red bird cherries by regurgitation. At this point I was obliged to leave the tent and request some curious boys to keep away, but the mother bird was back in a moment. In a short time the old birds began to alight on the peak of the tent, which was an observatory for them as well as for the person inside. Taking a look about, they would drop down to the nest only a step away. This was done more than ten times in the course of the day. Observations began at 8.40 in the morning and closed at 4.40, so that with an intermission at noon, they lasted nearly seven hours and twenty minutes. During this interval the young were fed with

wild red cherries, blueberries and insects, mainly grasshoppers, and nearly always by regurgitation. The nest and young were regularly cleaned, and the new conditions seemed to have been completely adopted. The young, whose wing-quills now showed half an inch of the feather-shaft, were entirely fearless.



Fig. 12. Cedar-bird's nest—No. 10 of table—in original position marked by arrows. See Figs. 9 and 13.

On July 16th, the second day of observation and the third after the removal of the nesting bough, the old birds began the work of feeding in exactly twelve minutes after the tent was in place. I will add here that I have always removed the tent at the end of the day's work, although in some species it would be of undoubted advantage to leave it overnight. In a little more than three hours the old birds came to the nest eighteen times, bringing abundant stores of fruit and insects.

On July 17th, the third day at this nest, feeding began in three minutes after closure of the tent. It was the hottest day of the summer, but life at the nest went on without accident or interruption. The young now sat or stood with heads upturned in the characteristic attitude shown in one of the illustrations. They flew on the morning of the nineteenth of July, when thirteen days old, seeking the cover of a thicket of birches close by, where they were cared for by their parents until ready to leave the neighborhood. They were scattered over an area of several square rods, and kept calling in their monotonous way, *z-e-e-e-e-t!* *z-e-e-e-e-t!* One of their number, shown in a photograph (Fig. 47), was not touched or posed, but occupied a natural perch chosen by himself in his flight from tree to tree.

This Oriole's nest (No. 19 of table) was fortunately placed in an apple tree scarcely twenty feet up, so that no gymnastic feat was needed to bring the branch to the ground.

The Baltimore Oriole.

The noisy young calling with incessant reiteration, *wick-ick-ick-ick-ick!* advertised their nest to every passer by, and it was surprising that it had remained unmolested.

This beautiful nest with the entire bough to which it was strung was moved eight yards from the tree, set up in the way described, and the tent was closed at a quarter past eight o'clock. After repeated visits to the apple tree both birds disappeared, but did not go out of hearing of their young, who in a half-hour's time began giving their *wick-ick-ick-ick!* with an emphasis sure to evoke response.

The old birds began to approach, sounding now and then their peculiar rattle, and the female could be seen exploring the foliage of a neighboring tree. At fifteen minutes past nine one of them was skirmishing about the tent, and in five minutes alighted above the nest with a green larva in bill. This larva however had another destiny that was apparent at the moment, for a puff of wind frightened the bird away. At her next visit a strawberry was brought and safely delivered, in exactly one hour and seventeen minutes from the beginning of operations.

Observations were continued until 4.25 P.M. or, allowing for the noon intermission, during seven and a quarter hours. In this period the parents were at the nest fifty times bringing insects and fruit. Sometimes the feedings would follow at two or three minute intervals; then longer lapses would occur.

On the second day, June 26th, the female brought food in five minutes after the tent was up, and during the space of six hours and twenty-three minutes while operations lasted, the young were fed one hundred and sixteen times by both birds. I left the tent and entered it again several times during the day, and once moved both bough and tent to improve the light. By this time the Orioles showed no fear, but came to the nesting branch in from one to two minutes after I had entered the tent. During an interval of ten minutes, the young were fed eleven times.



Fig. 13. Cedar-bird's nest in its new site. Nesting bough moved fifty feet to open field. Compare Figs. 1, 9, and 12.

The tent was closed at 8.30 on the morning of the third day, June 27th, and the first feeding came off in five minutes. In two hours and twenty-five minutes the old birds made forty-four visits to the nest bringing strawberries and insects, and towards eleven o'clock one of the

young who for a long time had been exercising his wing- and leg-muscles by climbing to the rim of the pouch, took his first flight, making a neighboring tree. Not long after, a second bird climbed out of the sack and was off, lured away by its parents. The third and last bird left a little later, and towards evening the young were calling from trees down the hillside.



Fig. 14. Baltimore Oriole inspecting young after having fed them.

The Redwing Blackbird.

On the fifth day of July a nest of three young Blackbirds (No. 2 of the table), aged five days, was found on the edge of what was once an alder swamp, close to the town and the "Cove" made by the Winnipiseogee River in Northfield. It was fixed to several slender stems of Spiræa, amid a dense tangle of Cephalthus, wild roses, and purple milkweeds. The situation was so attractive and offered such fine opportunities for studying these birds that, notwithstanding the water and mud, I determined to make careful preparations. A space four feet square was at once cleared of bushes at one side of the nest. In order to sky the birds, the nesting twigs were slightly raised, but none of these were severed or otherwise displaced.

On the ninth of July I built a raft or platform on the cleared area, and painted it green, possibly an unnecessary precaution. When weighted with the observer and his apparatus, the flooring was barely clear of the water. On the following day, the tent was pitched over this stranded raft and guyed to the bushes, the tent poles having been previously lengthened to suit the depth of mud and water. Everything was ready for observations at half-past nine o'clock. At first the birds fluttered around the nest *chucking* and whistling incessantly, but in less than an hour the warble of the male was heard, which is a sure sign of growing confidence. Then both birds went off for food, returned, reconnoitred the tent and nest, and after precisely one hour and twenty-three minutes from the beginning of observations the female came and fed her clamoring young. Again she was off and back three times in rapid succession. Three minutes later she was brooding, and remained on the nest thirteen minutes. Leaving it again, she examined the tent anew, then brooded ten minutes more. A little later the young were fed and the nest cleaned with great care.

The male was more cautious and did not actually feed his young until twenty-seven minutes after eleven. His fears were then dispelled and life at the nest went on without interruption. At about noon the old birds were using the tent as a half-way house, alighting on its peak and guys, and foraging about it for food. In the space of four hours on the first day, during which the birds were watched at a distance of about twenty-seven inches, fifty-four visits were made and the young were fed forty times. The female brooded her young over an hour, fed them twenty-nine times, and cleaned the nest thirteen times. The male made eleven visits, attending to sanitary matters but twice. This example illustrates as well as any which could be given the advantage which attends the use of the observation tent.

On the following day, July 11th, the female was at the nest and brooding her young in five minutes after the tent was in position. Presently she left to hunt for insects, alighted on the tent, and five minutes later was feeding her young and cleaning the nest. In the course of nearly three and one half hours, fifty-five visits were made and the young were fed collectively or singly forty-three times. At about half-past eleven o'clock one of the fledglings left the nest and was fed by the old birds in the surrounding bushes of the swamp. The female brought food thirty-two times, cleaned the nest eight times, and brooded eighteen times for intervals varying from thirty seconds to eighteen minutes. This bird cut a queer figure while standing or sitting in the sun, with wings spread and bristling like a turkey-cock with every feather erect, and with mouth agape, trying to keep cool while shielding her family from the heat. Her breathings were at the rate of 150 to 160 times a minute. The male bird served food eleven times and attended to sanitary matters once. In the course of forty-two minutes the first young bird to leave the nest was fed eight times, seven times by the mother and once by the father. Three days later the swamp was visited at just after sundown, when the young birds suddenly arose from the nest and flew off with ease and precision.



Fig. 15. Baltimore Oriole inspecting nest when behavior has become more free.

Kingbirds pose so well, especially about their nests, that I was anxious to see how they would stand the test of a sudden change in their surroundings. Accordingly, I watched with unusual care two nests which were found near my house. On the thirteenth day of June one had two and the other four eggs all freshly laid, and these appeared to be the full complement. Young were hatched in each nest on or near the twenty-fifth of the month.

The Kingbird.

The first nest was built at the top of a hill, about a rod from the Oriole's nest already described, on the horizontal limb of a small apple tree twelve feet up, and was a conspicuous object to all who passed that way. The nesting bough was removed and mounted in a good position on the morning of July 2d, and the tent was closed at half-past eight o'clock. At this time the two young were six days old and covered with light gray down. While the operation was in progress the old birds hovered over the nest, and with their usual boldness, swooped down close to my head, snapping their bills and uttering their piercing alarms.



Fig. 16. Tent over raft in water of swamp beside Redwing Blackbird's nest. See Figs. 21 and 22.

After the tent was closed, much to my surprise all became quiet, and I could see both birds —the female with insect in bill —exploring the nesting tree twenty feet away. She would fly to that point in space which the nest formerly occupied, and hover over it repeatedly, a characteristic action of many birds under such circumstances. Ten minutes later the female was again at the nesting tree with insects. For an hour afterwards all was quiet. The old birds were sitting by in silence, probably not far away. At ten minutes before eleven o'clock one of the pair, probably the female, came with a swoop to the nesting branch, and I believe fed her young. In this case the observer had to wait two hours and twenty minutes before having the birds close to his eye, but he was well repaid for the delay as the sequel will show. In one minute the mother had returned, and now both began to make up for lost time. In five hours and six minutes (from 10.50 A.M. to 4.36 P.M., allowing for an intermission of forty minutes when the observer was away), the old birds made seventy-five visits to the nest. Not only had they become accustomed to the tent, but soon paid little heed to anything about it, and one could photograph them at will, focusing directly upon the brooding or standing bird. After I had entered the tent, they would be at the nest in five minutes or even less time, and the young were often fed at half-minute intervals. Occasionally both birds were at the nest together, but this seldom happened unless the female was brooding.

On the second day the male came to the nesting branch in twelve minutes after the



Fig. 17. Female Kingbird balancing herself with raised wings while feeding young.



Fig. 18. Male Kingbird seeing a cicada safely down a hungry throat.



Fig. 19. Kingbirds rending an unruly dragon-fly. The female, who stands in front, was brooding when the prey was brought by the male.



Fig. 20. Kingbird family. The male—to the right—has captured a dragon-fly, whose stick of a body is seen projecting from the mouth of a young bird.

tent was in position, and the panoramic scenes of life at this nest went on without disturbance for the rest of that day. The birds were before your eye, literally at hand, and the observer had only to watch and record the rapidly shifting scenes with pencil and camera.

On the third day, July 4th, the female was on the bough in six minutes, and in six and a half minutes from the beginning of operations fed her brood.

The fourth day of study at this nest, or the sixth from the time of displacement, was the most interesting of all. There were now two foster children in addition to the two born in the house, for I had transferred two birds from a former nest (No. 21 of table). No protest was made at this intrusion, but the strangers were adopted almost immediately and fed and guarded with all the care given to their own offspring.



Fig. 21. Male Redwing Blackbird feeding young.



Fig. 22. Female Redwing Blackbird with feathers erect, keeping cool while shielding young from heat.

In the space of four hours (8.54 A.M. to 12.50 P.M.) the parents made one hundred and eight visits to the nest and fed their brood ninety-one times. In this task the female bore the larger share, bringing food more than fifty times, although the male made a good showing, having a record of thirty-seven visits to his credit. During this long interval the young were thus fed on the average of once in two and one half minutes. At each feeding usually one and but rarely two birds were served. During the first hour the young were fed on an average of once in one and a half minutes. The observer was kept on

the alert in recording what took place, and the scenes would often shift so quickly that it was difficult to decide which bird came to the nest. The mother brooded eighteen times, and altogether for the space of one hour and twenty minutes. The nest was cleaned seven times, and the nest and young were constantly inspected and picked all over by both birds, although the female was the more scrupulous in her attentions.

Whenever the male brought a large dragon-fly to the young an exciting scene was sure to follow. If the female happened to be brooding at the time, she would seize the struggling insect and try to start it down one of the hungry throats. If she failed in this the male would snatch it from her to try his skill, and usually with as little success. In this way the prey would be passed back and forth, until it was crushed between the bills of the two birds, or torn limb from limb. Some of these unequal contests between birds and insects are illustrated by the photographs.



Fig. 23. Young Kingbird eighteen days old. "The last to leave flew easily two hundred feet down the hillside."

When the male brought a moth miller and accidentally dropped it close to the tent, he went after it like a flash, and to place its security beyond doubt swallowed it himself. Again, one of the birds while perched near by was seen to disgorge the indigestible parts of its insect food, a common practice with fly-catchers both old and young.

I have added the foregoing details in order to show with what harmony life at the new nesting site proceeds when once the severed threads have been united. A knowledge of former conditions seemed to have been completely effaced. The nesting bough was defended with the same bold spirit for which this bird is celebrated. The young were brooded night and day, while birds of other species were constantly assailed and driven from the premises.

At noon on the ninth day of July one Kingbird, then full-fledged, was standing on the branch beside the nest. When touched he was off like a shot, and at this signal the others tried their wings for the first time and landed in the grass. After being replaced many times, two consented to remain, and spent that night in the old home, but forsook it the next morning, when two weeks old. The first nest, which had been displaced in a similar way and which as we have seen eventually contained two birds, was occupied eighteen days. The last to leave flew easily two hundred feet down the hillside on the thirteenth of July. After taking this one home to secure a photograph, I carried him to the hilltop and tossed him in the air. In his second flight which was long and good, he made a distant apple tree. Both old and young birds remained in the neighborhood for several weeks, and were still there when I went away in early August.

CHAPTER III.

TENT AND CAMERA: THE TOOLS OF BIRD-PHOTOGRAPHY.

PHOTOGRAPHY has become so essential to the practice of the other arts and sciences, that the student need not suffer from lack of advice, or of detailed manuals which treat every branch of the subject.

In the notes which follow I shall confine myself mainly to the results of personal experience in working with the tent.

The Observation Tent.—To satisfy the student and photographer of birds, the tent must not only afford a perfect means of concealment, but must be light, portable, easily adjusted, and to the fastidious, a most important consideration,—comfortable to work in.

The tent which I have used for two seasons and will now describe, meets these requirements fairly well. It is made of stout grass-green[1] denim, and with the frame weighs only six and one half pounds. It can be pitched in ten minutes almost anywhere, and may be compactly rolled, and carried for miles without serious inconvenience. It is 6½ ft. tall, 4½ ft. long, and 3½ ft wide, dimensions which will be found suitable for a person not much above the average height. One may spend any number of hours in it by day or night, and with a fair degree of comfort, excepting in very hot or sultry weather, when exposed to the sun on all sides. I have suspended operations but once on account of the heat, but there have been occasions when to have done so might have been better.

The tent frame is in three pieces, two upright poles or stakes with folding cross-bars, and an adjustable ridge-pole. The stakes should be from six to six and a half feet long, and may be easily lengthened at any time, as when the tent is to be pitched in a swamp or over mud and water. They are pointed at the lower ends which are set in the ground, and capped above with an arch of sheet zinc or iron to receive the ridge-pole. The latter is held in place with two pins or wire nails which are pressed through a hole in the zinc cap, and through the end of the ridge-pole into the upright stake. The eaves of the tent consist of a double fold of cloth projecting half an inch, to each corner of which is sewn a covered wire ring. When in position the tent is firmly guyed by small cords fastened to each ring. The flaps are placed at one of the corners, and may be pinned together when in use. The free lower border of the tent is fixed to the ground by wire pins, which may be pushed through the cloth at convenient places. From four to eight of these pins are needed, and each should be seven or eight inches long, and have a large soldered loop at one end.

The tent may be ventilated from above and made more comfortable on hot days by

[1] Brown or gray might answer as well. The green color serves to render the tent inconspicuous to both animals and men.

cutting out a large flap on each side of the roof, extending this a foot or less, and then guying each corner separately, at such an angle as to admit a free passage of air under the peak. For convenience I prefer the simpler form.

After working one summer with the tent I saw for the first time the interesting work of the brothers Kearton,[1] in which a different kind of blind is used. They devised an imitation tree-trunk, having a skeleton of bamboo rods and a covering of galvanized wire and green cloth, large enough to hold the photographer standing erect with his camera. The outside was painted in imitation of bark and decorated with moss and leaves. This was used in cases of nests placed on or near the ground in favorable situations. Mr. Kearton says it would hardly do to set this up beside an exposed nest like a lark's "in the middle of a bare ten-acre field," and to suit such a case they constructed an artificial rubbish heap, from which photographs were successfully made.



Fig. 24. The tools of bird-photography: the tent rolled up in portable form at right.

Such devices are of course unnecessary when the nesting site is brought under control, since in this case the birds must become accustomed to a changed environment, and the addition of the tent is a factor of no great importance. Then again the great heat of summer would prohibit their use in most parts of this country. Aside from the question of comfort however, the advantages of the tent lie in its convenience and portability. It is a simple means of attaining what is chiefly sought, perfect concealment. The reason it has not been adopted before possibly arises from the fact that the readiness with which many birds become accustomed to strange objects, or form new habits, has not hitherto been appreciated. Since individual and specific differences are so great in the class of birds, whose distribution is world-wide, one should not be surprised if there are many cases in which the tent or any similar blind would not work with success.

[1] *Wild Life at Home: How to Study and Photograph It.* By R. Kearton, illustrated by C. Kearton. Cassell & Company, 1899.

The Tent in Use.—Some difficulty may be experienced in pitching the tent in exactly the right position with reference to the nest, without the necessity of further change. The factors to be borne in mind are the height of the sun, the focal length of the lens, and the position of the window to be made in the tent-front directly opposite the nest. The front of the tent should be parallel with the nesting bough (when there is one), and the long axis of the latter should be parallel with the sun's course. The tent is so placed that the nest is in direct line, not with the middle of the tent, but with the window to one side. When the observer stands within, facing the nest, the window lies to his left, at one side of the vertical stake, and either just over the cross-piece or somewhere below it, depending on the height of the nest from the ground. The tent will not overshadow the nesting bough when once it is in proper position.

If the focal length of the lens be 6½ inches, and the nest that of a Cedar Waxwing, which is mounted at the height of four feet, and the tent be so placed that the front of the lens is twenty-eight inches from the rim of the nest, we shall get a picture with adequate setting on a 4 x 5 plate, like many shown in the engravings. With lenses of longer focus, which it is advisable to use if possible, it is not necessary to approach so near. The large Robin pictures were made with a 9 $\frac{7}{16}$ inch lens on a 5 x 7 plate, at a distance of about four feet.

When the position has been determined the tent-poles are set firmly into the ground, the ridge-pole adjusted and the tent-cloth thrown over it. It saves time to lay one end of the peak in position and draw the other over to its proper place. The cross-pieces are then lowered from the inside and the guys loosely set. A flap about six inches square is then cut with scissors in the front of the tent, to the left of the pole opposite the nest, which can be viewed through the opening. Should the position subsequently prove to be wrong, the poles may be raised both together and reset. When everything is right the guys are tightened, and the free edges fixed to the ground with wire pins, which will hold the walls taut and prevent excessive flapping when there is wind. It is often convenient to have the flap at the front on the operator's left so that one leg of the tripod may project through it.

The proper adjustment of the camera follows, the nest being the object focused until the old birds appear. I have found it advantageous to pin the focusing cloth firmly around the camera so that it is always in position for use, and to stretch a piece of green denim on the side of the camera next the observer, fixing it between the front fold of the focusing cloth and the tent so that it hangs vertical, and effectually conceals the operator when standing upright and setting the shutter. Peep-holes are made to command all directions, and of course the nesting bough to which attention is mainly given. It is convenient to make small V-shaped openings which can be pinned up or down. A bird will sometimes detect some movement of the eye when close to such openings, so that they should not be made larger or more numerous than necessary.

When a photograph has been made and the shutter is to be reset, the vertical flap is released from the focusing cloth and carefully drawn over the window, if the birds happen to be at the nest as when the female is brooding. Otherwise if timid or unaccustomed to the new conditions, the movement of the hand may be a source of alarm. I have successively photographed family groups without disturbing them, when at a distance of twenty-eight to thirty-six inches, after they had learned to disregard the click of the shutter. When a window in a different position is wanted, the old one is patched up and a new one made.

Camera.—Any good long focus camera with reversible back will answer, the size and weight being the considerations of greatest moment. Most naturalists and sportsmen, who travel long distances and carry their own traps, find a camera which takes a 4 x 5 plate the most convenient and economical. I have used this, but for work with the tent prefer the 5 x 7 size because it gives a larger and better picture of the object sought. The large camera with a heavy lens may be a drag on the mind and body of the most enthusiastic pedestrian, but one is usually amply repaid for the greater trouble involved. For long journeys however the lightest possible outfit is decidedly preferable.

In working at short range with lenses of moderate focus the long bellows is a necessity, and at the same time enables one to take full sized pictures of small objects, as well as to use the telephoto lens should this be desired. The reversible back, making it possible to reverse the position of the plate without moving the camera and often without disturbing the bird, is an adjunct of the greatest convenience.

While the best tools are always to be desired, excellent pictures can be made with a cheap outfit, provided the lens is rapid enough. Nearly all of my own work has been done in the tent with the birds at hand, but in taking quick shots of birds or quadrupeds when there is no lure to chain them to a given spot a hand-box camera is needed. The lens should be of long focus, and the adjustments such as to enable the operator to focus and expose as nearly simultaneously as possible. To meet these requirements the twin-lens and reflecting cameras, both of which are old inventions,[1] have in recent years been placed on the market in improved and serviceable forms.

The "twin-lens" consists of two cameras, set one above the other, the bellows of which move as one. The lower takes the picture, while the upper gives the image which is reflected on a glass plate set in the top of the box. Besides being expensive and heavy, the trade sizes of these cameras are apt to be of too short focus to be of much service to the animal photographer.

The reflecting camera[2] does the work of the two lenses with a single lens and bellows, and in the recent designs is provided with a focal plane shutter, which is one of the best for exposures quicker than the $\frac{1}{100}$ second mark of ordinary shutters. Like the upper half of the "twin-lens" it has a movable mirror, set at an angle of 45°, which casts the image made by the lens on a plate of ground glass set in the top of the box and shielded by an adjustable hood. The mirror is so placed between the plate and lens that the distance from lens to sensitive plate equals the distance traversed by light in passing from lens to mirror and ground glass. When the object is focused, a lever is pressed which raises the mirror and automatically releases the shutter. One must expect to find the image on the ground glass somewhat dimmer than when no interposing mirror is used. To be most serviceable this camera should have a long bellows.

The Lens.—In animal photography short and long focus, and telephoto lenses are available. My own experience has been mainly limited to the following: Zeiss Anastigmat

[1] The principle of the reflecting camera was applied as early as 1860, and various forms of the reflex type were devised during the next thirty years. In 1891 Dr. Krügener of Frankfort brought out his "Normal Reflex-Camera," in which the construction, though somewhat complicated, was much improved. The principles are essentially the same in the later designs: see *Ausführliches Handbuch der Photographie*, by Josef Maria Eder, Halle, 1891. For an account of the reflecting camera with focal plane shutter, by Mr. John Rowley, see *Bird Lore*, April, 1900.

[2] Manufactured by the Reflex Camera Co., Yonkers, N. Y.

Series ii a, 6½ inch, speed $\frac{f}{8}$: Convertible Anastigmat, Series vii a, combined equivalent focus 8 inches, speed $\frac{f}{6.3}$; Extra Rapid Universal Lens, Series D, 9 $\frac{7}{8}$ inch, speed $\frac{f}{6}$.[1]

The convertible anastigmats are convertible in two or three lenses of different foci, according as the single anastigmats are of equal or different focus. They thus combine in a single lens the possibilities of working with short and long focus, the greatest speed being obtained when each system of the doublet has the same focus.



Fig. 25. Female Brown Thrush stepping into her nest to brood.

In photographing animals close at hand the anastigmatic qualities of a lens count for little. It is depth of focus combined with high speed which are most needed, consequently any lens possessing these qualities will answer.

One of the most difficult problems in bird-photography has hitherto been that of approach within "shooting" distance. The control of the nesting site, and the use of the tent offer a solution so far as life at the nest is concerned, in at least many species, and the tent in its general use does away with the need of the very long focus or telephoto lenses.

[1] These lenses are made by the Bausch & Lomb Optical Co., Rochester, N. Y.

In photographing birds sitting, brooding, or standing at the nest there is no difficulty with a lens of speed $\frac{f}{8}$, which requires $\frac{1}{25}$ second to fully expose the plate, at a distance of twenty-eight inches with full lens and strong light. With scenes in which the actors are in constant motion, however, we require a much faster lens, which will reduce the exposure to at least $\frac{1}{50}$ of a second.

For photographing inaccessible nests, and birds which pose well but are unapproachable under ordinary conditions, we must resort to the long focus and telephoto lenses. The long exposure required for the telephoto lenses now on the market, from one half a second to a second or more, restricts their use to comparatively rare and lucky chances

The Tripod.—When two cameras are carried of the 4 x 5 and 5 x 7 size, a single tripod will answer for both, provided it is moderately stiff about the head. A two-length tripod of medium weight will serve most purposes, but a shorter one is also required for nests on or near the ground. This is best made by cutting down one of the ordinary kind, rather than resorting to those of the multifolding type, which are constantly spreading and slipping at critical moments.

The "Graphic" ball and socket clamp, used as a camera holder for the bicycle, has been strongly recommended as a substitute for the tripod or as an adjunct to it, as in photographing nests in trees, when the clamp which is screwed to the camera is fastened to a convenient limb, but since my own work has been of another kind, I have had little occasion for its use.

The Shutter.—In photographing birds whose sense of hearing is well known to be acute, next to a good lens, a silent shutter is most needed, especially when the camera is less than three feet away. The shutter which is silent not only in name but in actual use, and at all speeds, is at present one of the greatest needs in the photography of animals, and especially of birds.

Birds will often jump into the air as if shot, at the first click of the metallic shutter. Fortunately, however, the force of habit now comes to our aid, since they gradually learn that it is harmless, and may be safely disregarded.

The "iris diaphragm shutter," which I have mainly used, is often troublesome in that some part of the sound arises at the very beginning of the exposure, so that a startled bird in the course of $\frac{1}{20}$ of a second may be all over your plate. The marks on all such shutters, which are conventional rather than exact time measurements, differ in different shutters of the same or different make, and their limit of rapidity does not exceed "$\frac{1}{100}$ second." For greater speeds the focal plane or some other very rapid shutter must be used.

Plates.—For animal photography the most rapid plates are none too fast, and any of the best brands can be recommended. It is always a good plan to adhere to one kind which has proved satisfactory. One piece of advice should not come amiss, which is to always use fresh plates, and all of the same emulsion if possible, and if any doubt as to their age exists, to test them before starting on an expedition. Old plates blacken along their edges in a characteristic manner, when placed in the developer, and if deterioration passes this stage the whole plate will fog. The dusting of plates, slides, and holders before reloading, and the carriage of all unused plates in a dust-proof bag, are as much a necessity now as ever.

Much of my own work has been done in the country with dark room and base of

supplies close at hand. Under these conditions it is not necessary to carry more than two or three dozen plates at a time. By developing on the day of exposure it is possible to correct errors or fill up the gaps on the day following.

Orthochromatic plates require careful treatment, but in skillful hands offer advantages which should not be neglected. This is well illustrated in the case of birds of brilliant colors like the Orioles, which on ordinary plates appear as "Blackbirds" (compare figures 14, 15).

Accessories.—The minor articles which are needed to complete the photographer's outfit, all of which can be rolled up with the tent or better carried in a hand bag, will be suggested by a little experience in the field. A saw, hatchet and nails are often required, as well as scissors, pins, the supply of which is always liable to run out, and a small hand mirror for use in setting the shutter from the rear. A toilet hand mirror which can be turned at any angle is a convenient means of inspecting the interior of nests inaccessible to the hand, but within reach of the mirror attached to a pole.



CHAPTER IV.

THE ROBIN AT ARM'S LENGTH.

It would be hard to find a better symbol of cheerfulness than the Robin singing through the rain. The green grass pricking through the April snow is a pleasant sight because it is the sign of spring. For the same reason the snow-laden twigs of the apple tree on the lawn take on a new interest when a Robin alights in them and turns its bright breast to your window.

NO bird is better known in America than the Robin who annually visits nearly every part of the continent. Upon the whole it shuns the forest and comes to the haunts of man, to the farm, the village and the city street, with their attractive orchards and parks, their long lines of shade trees and green lawns.



Fig. 26. "Robin snow" in April × 3.

Is it possible to say anything new about such a familiar personality? Not much, you may think, yet it will be interesting to study our friend at a closer range than is usually possible. In this case we shall "make the mountain come to Mahomet," or bring the nest from the treetop to a point nearer the ground, where there is no foliage to obscure our vision, and where we can see every thing that transpires, within reach of the hand.

Birds differ slightly in every bodily character, as well as in every mental trait, and while we commonly meet with average types, extremes of temperament are by no means rare. This fact is illustrated by the Robins whose history follows.

One pair dwelt in the woods and were exceedingly wary, while the other was comfortably settled in town, and lived on a familiar footing with man. The town Robins had, I suspected, already led forth a brood from a pine tree on the bank close to my house, but at all events there was a new nest in the apple tree on the top of the hill, and on the twenty-fifth of July the mother bird was sitting on three blue eggs. Incubation lasted about two weeks, and life at the nest about twelve days.



Fig. 27. Head of Cock Robin, life-size × 4½.



Fig. 28. Head of female Robin, life-size × 4½. Photographed at nest immediately after the young were fed. The slime from their throats sticks to her bill.

When the young were three days old the mother passed some moments of great suspense. A small flock of Crow Blackbirds alighted on her tree, but either did not discover the nest, or thought better of disturbing it after seeing its guardian. The wily old Robin stood alert on the rim of the nest, but said never a word, a plan which good sense and intelligence could not have improved upon. When the young were eight days old, the entire bough was sawn off, carefully lowered to the ground and set up on the hillside.

In exactly fifty-five minutes from the beginning of operations the mother appeared with a large grasshopper, which she gave to the young, and afterwards cleaned the nest. The male came also, when the comparative safety of the new conditions had become apparent, but approached with more caution. At first both birds flew to the tree by their accustomed paths, and examined the place where their bough had been lopped off, and in their admirable and fearless manner blustered about for a while, taking no pains to conceal their anger. Of course they knew where their young were all the time, for in certain directions their vision is keener than any man's.

We know well with what confidence the Robin flies direct to its nest, when no danger threatens, but under the present circumstances their suspicions might well have been aroused. The absence of sound and motion in strange objects is always reassuring, and soon Mother Robin could be seen perched on the top of an apple tree, surveying the field. She called *seet! seet!* while the grasshopper in her bill squirmed to get free, and the young chirped loudly in reply.

When their behavior is free and spontaneous it is pleasant to see these birds act promptly without apparent hesitation. They haggle over nothing but follow the bent of their strongest instincts. In the present case the fear which controls them for a time, and overpowers their strong parental love, is gradually worn away. Suddenly down comes one of the old birds with all its weight on the limb. The young have felt similar vibrations before and know what to expect. Up go the three heads at once, each mounted on a slender stalk, and each bearing at its apex what might suggest a full-blown, brilliant flower, for as is well known, the extent of their gape is extraordinary and the inside of the mouth has a bright orange hue. The young tremble with violent emotions as they jostle, struggle, and call with undiminished zeal even after being fed.

After the first visit had proved successful, confidence was established at once, the female and later the male coming to the young at intervals of about five minutes, bringing grasshoppers, and occasionally removing the excreta or devouring it on the spot. They frequently carried five or six insects at one load, when their bills would suggest a solid stalk of grasshoppers, all struggling to get free.

The mother did not touch the nest with her feet at the time of her first visit, but clasped a small vertical branch, and bent down over her young, but ever after both birds would alight on the broad rim of the nest, and from this vantage point feed, inspect, and clean the young, one at a time. They suffer nothing to waste, and rarely allow a cricket or grasshopper to escape, but releasing one at a time see it safely down an open mouth. Then after inspection is over they fly to the nearest perch, and make haste to clean their bills and set their dress in order. This done, there is often a pause of a few moments as if in doubt whether to hunt more grasshoppers, to dig angleworms in yonder cornfield, or to try the cherry trees along the fence-row. They will take everything which their sharp eye discerns, and often pick up an insect close to the nest.

One Robin at the age of eleven days left the family circle early on August 13th, and at nine o'clock the two which remained were standing up and flapping their wings. The old birds would come near, displaying tempting morsels in their bills, but with no intention of feeding their young so long as they remained on the nest. By such tantalizing methods they soon drew them away. Both old and young hung about the apple trees for several days, when they disappeared and were not seen again.



Fig. 29. Female Robin brooding on a hot day — her left wing pushed up by a young bird.

At the stage of flight the young Robins have several distinct call and alarm notes like those of the adult birds. They can take short, low flights, can hop briskly, and go to cover instinctively whether with or without warnings. They will also lie quiet in the grass, as in hiding, a common instinctive act.

The second family of Robins nested high in an oak, and whenever they were approached the old birds made an admirable show of pugnacity, scolding, screaming, erecting their feathers, snapping their bills and darting straight at your head. Their nesting branch was taken from the woods to a bare, open field, and set up sixty feet from the tree in the way already described. The first morning's experience was rather discouraging, for neither bird would come to its nest while the tent was in front of it. They



Fig. 30. Female Robin inspecting her household immediately after the young have been fed: a characteristic attitude.



Fig. 31. Male Robin serving a cluster of angleworms and a grasshopper. Notice his position here on the right as in all other pictures of this nest. See Chapter XII.

called plaintively from the trees, and circled about the nesting bough again and again, but always kept at a distance. Accordingly, after feeding the young, I decided to strike tent and wait until next day. There was a heavy thunder storm in the afternoon, but when I visited the nest towards evening I was pleased to find the young as lively as ever, and the old birds on guard with their usual spirit and tenacity unimpaired.

The next morning they stormed vigorously about the tent and the male even came to the nest while I was standing near. After closing the tent I was under the cross-fire of their wrath for seven or eight minutes, when the alarm calls suddenly ceased, and in two minutes more the mother was on the nesting bough. The female actually came to the nest or to the branch which held it eight times in succession, in the space of twelve minutes, with insect ready but without delivering it. Matters did not altogether please her yet, and with a shrill *seet ! seet !* away she would go, but only to return a half minute later. Finally she came boldly to the nest's brim, uttered a sound like *cuck ! cuck !* which means "Open wide!" and produced a number of sturdy looking grasshoppers. Two minutes later the mother came again, and after feeding the young, picked them all over, spending a minute and a half in the duties of inspecting and cleaning. It was a hard task to conquer these birds, but they had to submit to the inevitable, and I have no doubt but a few days more would have brought them to the hand.

The relative strength of the parental instinct was well illustrated by the behavior of these Robins. The female was always the first at the nest, and came at forty minutes after nine o'clock on the second day. The male though constantly skirmishing about with bill loaded, was not on the branch with food until two hours and ten minutes later. Meantime the mother had been giving the young her constant attention. The cock, though at the nest or on the bough several times, did not actually have the courage to feed his little ones until long past noon. In the performance of this duty he was three hours and four minutes behind his mate.

When the male did come at last and deliver food, he gave the nest a good cleaning, and flew off to a corn patch a hundred yards away. In thirteen minutes, during which interval the female had brought grasshoppers twice, the male returned triumphantly with a great cluster of writhing angleworms. After safely dispensing them, he went the rounds of inspection, devoured the excreta, then stood for a full minute on the rim of his nest and with crest erect called, *wit ! wit ! wit !* as if to celebrate a victory and announce his bravery to the world. Now and again the cock came to the nesting bough but without food. He wished only to take a look and see that all was well. At one of these visits he stood on silent guard for full ten minutes, then sped away calling loudly, *wit ! wit ! wit !*

In the course of the same day a Robin, possibly a young bird, alighted on the peak of the tent, surveyed the situation, and passed on. When eight days old, on July 26th, the young began to present their spotted breasts over the walls of the nest and to spread, stretch, and flap their wings, the quills of which now showed half an inch of feather at the tips. At every visit of their elders the whole brood went wild with excitement, but soon quieted down, and the intervals were spent in preening their sprouting feathers, calling for more food, or dozing with heads hanging down over the edge of the nest.

The third day opened warm and clear, and towards noon became very hot. Mother

Robin began to brood at twelve o'clock and for the space of three hours was on and off the nest constantly, rarely remaining longer than ten minutes at a time either at her post or away from it. On the fourth day, July 28th, which was destined to be hotter still, brooding began at exactly eighteen minutes before ten o'clock and the mother was quietly sitting over the little ones when the tent was struck long past noon.



Fig. 32. Cock Robin standing at inspection, after having fed his young.

Many charming scenes were enacted at this nest during the day, but colored phrases or colorless pictures do them scant justice. You must fill in the backgrounds of soft blues and greens, and add the touch of life and color to the actors on the stage.

The following extracts from my notes of this day may give some idea of the panoramic character of the scenes, in which the element of repetition is not wanting.

July 28, 4th day in tent. 10 A.M. The female comes to the back of the nest, delivers food and goes the rounds of inspection and cleaning, devouring the excreta on the spot, then settles down on the margin of the nest, steps in and gradually tucks the young under her breast and wings.

10.12. A whirring sound announces the coming of the male. He approaches always on the observer's right, and deliberately hops down to the nest. He is bringing a big cluster of earthworms. The young get the message the moment the branch is touched, and poke their heads out from under their mother's tail, wings, and head, sometimes raising her bodily, and almost tipping her over. However, she holds

her place until her mate is close by, then hops up and stands to one side, finally leaving him to deliver what he has brought.

10.15. The mother is back with food, but it was down the throat of a young one before I could tell what it was. Cleaning and brooding them followed in due course as before.

10.18. Cock Robin comes again, but my eye was again off the nest, and in a moment the business was done. Mother Robin stays and broods. I change the shutter, open and close the tent window without giving her any apparent anxiety.

10.30. Another visit from the male, who comes quickly, delivers a grasshopper or two and departs, while his faithful mate resumes her post of duty.

10.45. The cock brings another coil of angleworms, and the hen, leaving her charge just long enough for the business of feeding, drops back on the nest.

10.55. The male is taking it easy. This time he has an unusually large grasshopper, which is not cut in twain but delivered whole. At the signal of his approach the mother leaves, having brooded forty minutes by the watch.

10.57. Two minutes elapse. Back comes the *alma mater*, loaded to the muzzle with blueberries, which are shot out one by one, and strike the yellow targets in the bull's eye every time. She comes to the farther side and broods at the moment the preliminary work of feeding and inspection is over.

11.16. The male has now brought a load of bright red choke cherries. He hops down the branch by the usual path and up to the nest, but the female, who is brooding, strangely keeps her position and, whether from absent-mindedness or caprice, refuses to budge. When the male gives an impatient *cuck! cuck!* the mother can keep her position no longer, for the young upset her equilibrium in their struggle, and she hops to one side. Resuming her place she sits there in the bright sunshine, with back to the tent, mouth agape, and crest erect. Twenty inches away are the tent, the camera, and the eye of the observer, but for none of these things does she now care a straw. They have been thoroughly tested and found harmless.

11.43. Cock Robin is on hand with a beak full of grasshoppers coming, as is now his invariable custom, to the right side. On this occasion the mother hopped up promptly and received a part of the food into her own bill. Did she eat it? Not a particle. The young got it all. The male then retired, followed closely by his mate. In one minute she has captured prey and is back to her brood. The young erect their crests like their elders, and flapping their half-fledged wings, try to climb to the edge of the nest, but without success.

The last day of July opened hot and sultry, and when I approached the nest one young Robin was already out, and making for the highest point of the nesting bough. He cheeped aloud for food, and looked uncomfortable, for the heat was already strong. The male only was in attendance as on the previous day, the female being occupied, as I suspected, in starting a new nest.

It was difficult to get any food past this enterprising fledgling, who stood in the path and took everything that was brought. Several times the bird would make a move as if intending to fly to the peak of the tent, and might have done so, had I not decided to replace him in his nest. The expected certainly happened, for all tumbled out shrieking and squealing. Put them back and out they would go again, and flop down on the

grass. At last two birds consented to remain for a few minutes, when the male came with an angleworm and a large green katydid. He paused a moment while I photographed him, and this proved to be the closing scene. The curtain dropped suddenly when first one bird and then the other left their home forever, not even waiting to get the katydid. The old bird at once led his brood to the woods, and being able to take short flights, they had no difficulty in finding safe quarters.

The number of times the young are fed in the course of the day depends upon their age and the weather. The older they are the more food they require. At this nest the labor of feeding and cleaning was shared about equally by both birds, but on hot days the female was necessarily less active since there was much brooding to be done.

The following table illustrates the relative activities of this pair in caring for their young, the time of observation being approximately from nine o'clock until three in the afternoon.

Period of Observation.	Second Day.	Third Day.	Fourth Day.
Age of young.....	8 days	9 days	10 days
Fed by male.....	15 times	24 times	15 times
Fed by female.....	18 times	28 times	14 times
Brooded by female		6 times (44 min.)	8 times (2 hours 41 min.)
Rate of feeding.....	Once in 11–12 min.	Once in 7–8 min.	Once in 8–9 min.
Period of observation...	9.30 A.M. to 3.53 P.M.	9.05 A.M. to 3.44 P.M.	9.11 A.M. to 1.58 P.M.

The nature of the food, which depends much on the local supply or the condition of the market, consisted mainly of grasshoppers and angle worms, to which we must add a few insect larvæ, beetles, locusts, and katydids, while the list of fruits included blueberries—most in favor—choke cherries, and raspberries.

As to the sanitation of the nest, inspection, as we have seen, follows each feeding. The nest was cleaned during the period given in the table every fifteen minutes, and mostly by the female, who devoured a part of the excreta at the nest and carried the rest away.

The Robin has been known to pass the winter in Nova Scotia, where it feeds on wild dry fruits, like dogwood berries, and at all intermediate points between its northern and southern ranges, wherever the food supply is good. Thus in the cold valleys of the White Mountains, where there is snow during the greater part of the year, and where the mercury sometimes freezes, flocks of Robins are said to spend the winter, feeding on the wild berries which are cached above the snow. The winter birds are probably in most cases migrants from farther north.

The food of the Robin consists, as we have seen, of small animals, mainly insects and worms, and of wild fruits in about equal quantity. It has been shown[1] that cultivated fruits are eaten only as a makeshift and mainly in the months of June and July.

Spring Robins reach Cleveland, Ohio, on the last days of February or the first of March, central New Hampshire the third week in March, and I have seen them in Bur-

[1] By Beal who found forty-two per cent of animal matter in three hundred and thirty stomachs of these birds.

lington, Vermont, on March 30th. A few Bluebirds are usually reported on the same day. In 1900, Robins were heard or seen in different parts of Cleveland on the ninth of March, a mild, bright day, while but a week before the country was in the grip of one of the worst ice-storms ever known in this region. Every exposed object was incased in solid ice for days and the birds fasted or starved.

In the choice of a nesting site, the Robin, as we have seen, obeys no law. The apple tree, which from its mode of branching yields wide, open crotches and safe



Fig. 33. Female Robin in act of cleaning the nest.

horizontal supports, is generally chosen, but they also resort to the leafy elm, the evergreen, the dense and remote woods, or like the Phœbe, accept the hospitality of barn, porch, or shed. In the course of one afternoon in Sanbornton, New Hampshire, I once found six nests all under cover. One was fixed to a beam inside an old barn, already occupied by Swallows, the only means of entrance and egress being cracks between the boards of the gable above the haymow. The Swallows shot with unerring aim through these cracks, but one of their full-fledged young, which lay dead on the hay, had apparently dashed its brains out in attempting this feat. In a dilapidated shed of another barn, then abandoned, were three nests, two of which set in line and close together, were doubtless the work of the same builders.

Where the nest has already begun to crumble into ruins by the time the young fly,

it is often abandoned and a new one built for the second brood, but whether a new nest shall be built or not depends rather upon habit or caprice than actual need. The old nest is sometimes repaired, or even occupied without change during the same season. On the other hand, three nests are sometimes built in line and under cover, where a single one if put in good repair would have answered the purpose. I once saw a Robin's nest fixed to the end of a stick of wood that leaned against the side of a barn, and the stone-gray color of the background formed an excellent screen for its concealment.



Fig. 34. Head of female Robin—life size. × 2¼.

Many wild birds, such as Robins, Orioles, Wrens, Woodpeckers, to mention only a few species, breed within the confines of cities, and the question naturally arises, — do the birds come to town, or does the town go to them? We know how strong is the instinct for young birds to return to the place of their birth, if not to the selfsame spot, at least to the same neighborhood, and they continue to do this until driven off by enemies or by hard times. My house in Cleveland happens to be placed in the midst of what was an apple orchard of a large farm a generation ago, and a few of its ancient trees still remain in the back yard. Are the Robins which nest in them to-day the descendants of the birds which used to come to the old farm? Possibly, for the birds will return, so long as the human inhabitants and the food which their presence insures remain. In this way many birds have undoubtedly grown into city life. As the farm became a part of the village and the village was swallowed by the town, the migratory species, true to their old associations, returned to their former haunts each spring. I have known two illustrations of this in Cleveland, where Red-headed Woodpeckers clung to the ancestral tree until enveloped by miles of city streets, and indeed until their old home was actually destroyed.

On the other hand it is true that many shy and timid birds often leave their seclusion and come to the haunts of man, and this is not remarkable when we remember how much

individuals differ in relative tameness and wildness, and how rapidly new habits are formed.

As to the abundance of food on which bird-life depends, some species, like the Robin, would seem to fare equally well in the country, and as to protection, much better. Young Robins have no more persistent and fatal enemy than cats, and every one who has possessed a city yard knows to what extent it is overrun by tommies and tabbies. In the city also one has to reckon with the large floating population of famished vagrants, which the biological laboratory is never able to fully claim. They are also on hand to rake the young broods out of the nests, and pick up the fledglings which are frightened off prematurely and drop to the ground. Though forced to build high, city Robins find it impossible to get beyond the reach of some rough-and-ready climbers of whom Jan Steen was a shining example, and were every thomas as fearless and expert in tree-climbing as he, this race of birds would soon be driven out or exterminated. Some Robins used to nest in the very top of a neighboring apple tree, but Jan found them out and watched their actions attentively from day to day. One fine afternoon he decided to bring down the whole brood. He had climbed to the tree top and was clawing at the nest, when fortunately his plans and equilibrium were upset in the nick of time by a well-directed missile.

Although the Robin is one of our most common birds its gregarious habits seem to have attracted little attention until Mr. Brewster's account appeared in 1890. His record for Cambridge, Massachusetts, extends back to 1867. At one roost he estimated the number of birds at 25,000 (August 4, 1875). The old males and first broods in spotted plumage compose these assemblages during the second and third weeks of June. By the middle of July the movement becomes more general and by August 1st, the roost is made up of young and old of both sexes and of all conditions. Mr. Faxon saw a male after feeding its young fly off to its roost one and one fourth miles away at 7.30 P.M., while the female apparently remained for the night and brooded her young.

These local associations seem to be based upon the instinct of protection and sociability, and it is important to observe that the old lead the way while the young follow, suggesting, as Mr. Brewster remarks, what usually takes place in the annual migration.[1]

A winter Robin roost, in a swamp of matted reeds, resorted to at night by thousands of birds, has also been described in Missouri. At daybreak the host dispersed in all directions, some going fifty miles to their feeding grounds.[2]

[1] *The Auk*, vol. vii., October, 1890.

[2] O. Widmann ; *The Auk*, vol. xii., 1895.

CHAPTER V.

THE CEDAR-BIRD.

ON the twenty-seventh of May, I saw a small company of birds settling in the topmost branches of an elm. You might infer from their behavior that they were new arrivals. They keep together, sit prim and erect, and move about as if under discipline. With a glass you can see their erected crests, their sleek drab plumage, and recognize at once the familiar Cedar or Cherry Bird.

At Northfield, New Hampshire, the earliest nests have eggs by the first or second week in June, but the breeding season is not at its height until the last of July or August. A few still have young in the nest in early September, when many are flocking or have already started southward. Professor Baird speaks of finding these birds sitting on their unhatched eggs as late as the twelfth day of October.

The winter flocks of Cedar Waxwings, which are occasionally seen in Northern New England, are probably migrants whose summer home is farther north.

The Cedar-birds borrow no trouble from their neighbors, and seem to lead a life of ease and pleasure, lessening their denominator when the times are hard, but living high when cherries are ripe. The nesting season, which brings much that is sweet and bitter to the lives of most birds, appears to give them the least anxiety. The immaturity of their eggs at a time when most of our birds have already reared their first broods is a striking fact, and is due to some unknown cause which retards the growth of the ovaries. It is evidently not caused by a lack of suitable food as some have supposed, since the case of the Goldfinch is similar. The young Cedar-bird gets about the same kind of food as the young Robin or Oriole, and it is not likely that a greater or less amount of fruit in the diet of old or young would sensibly alter their condition. So quiet and retired is the Cedar-bird, it may live in comparative seclusion although not three rods from your house, and may remain on your grounds for the whole summer unnoticed, unless some one is on the watch, so that the name "chatterer" formerly applied to the family,[1] can have only an ironical significance in this least garrulous of birds. The fondness of this bird for the berries of the red cedar and for cherries is responsible for two of its commonest names, while the term "waxwing" has reference to the peculiar horny scales of the secondary wing-quills, which look as if tipped with red sealing-wax. Less commonly, the tail also bears similar appendages, but there is much variation in their appearance in both old and

[1] This epithet is said to have been first applied to the Bohemian Waxwing, because of its Latin name, *Ampelis garrulus*, the specific term *garrulus* having been suggested by the crest and slight resemblance in the color of this bird to the European Jay, *Garrulus glandarius*. See Schufeldt, *Chapters on the Natural History of the United States*.

young. Most of the birds which I have studied at the nest have been entirely lacking in appendages of this kind.

Late in spring the Cedar-birds are seen coursing about in small squads, selecting some treetop for an observatory, and always showing the most marked uniformity, there being little to distinguish the sexes either in size or color. Their plump oval forms and easy, undulating flight are characteristic, and their manner of flying and perching in compact bodies as one bird should not escape the observer. Apple trees of moderate size are in high favor, since they afford such fine opportunities for nest-building, and are usually surrounded by good feeding grounds.

Two summers ago some Waxwings built on the horizontal bough of a pine tree, just above a Robin's nest. Song Sparrows and Chipping Sparrows also occupied the same tree. They usually frequent scrubby pastures, selecting the witch-hazel, or thorn-apple bushes by preference, and occasionally a small sapling oak or maple. The nest is either set in a fork or saddled to a spreading branch, at a height of from five to twenty feet. It is nicely wrought from vegetable and animal material such as dead grass, roots, fine twigs, weed-stems, pine needles, wool, yarn, and twine. A nest built in an orchard was composed of dead clover stems, witch grass, with thistle-down and the fluffy heads of the Indian tobacco, a plant growing close by, worked over its rim and interior.



Fig. 35. Cedar-bird chorus at the most exciting moment just before food is served, August 6, 1899, two days before flight and the development of the sense of fear. Life-size × 3.

Four or five eggs are ordinarily laid, but the total product of ten nests which I examined in 1899 was only thirty-six eggs, out of which about twenty-five young were hatched and from sixteen to twenty reared.

The parental instincts during the early days of nest-building and incubation are often weak, and this is shown to a marked degree in the Cedar-bird, who is easily robbed and ever ready to take fright and abandon its eggs.

During the month of July a pair began to collect nesting material in an apple tree in full view from our porch, and I frequently watched them at work through an opera-glass, and once or twice passed under their tree. This inspection of their private affairs pleased them so little that they left their completed nest, and moved to the adjoining field a few rods away, where there was less publicity, and where five eggs hatched out on the twenty-sixth of August. A nest built in a young oak tree in a remote clearing was discovered on August 7th, when it contained a single egg. I did not see the old birds on this occasion and heard but a faint sound, which was evidently a murmur of remonstrance since their nest was promptly forsaken.



Fig. 36. The female Cedar-bird broods, while the male passes the cherries around. He stands at the back with his gullet loaded and a berry in bill.

I have camped beside four different nests of the Cedar Waxwings, and after having spent nearly a week in watching the behavior of both old and young birds at short range, feel that I know by heart most of their nesting habits.

There is a certain routine or etiquette which is observed by all birds at the nests. Certain duties must be performed over and over, such as the capture of prey, bringing it and distributing it to the young, inspecting and cleaning the household, besides brooding the young, especially during the early days of life in the nest. To record each visit made and every recurring act performed by the birds would make tedious reading, but strange to say it never seems monotonous to the observer. As the young birds grow older, and begin to stand on the rim of the nest, they furnish ample excitement, and while their theme is always the same, it is delivered with innumerable variations.

The method of controlling the nesting site was first suggested by some Cedar-birds, whose nest of four eggs was in a thorn-apple bush, and about seven feet from the ground. The main stem supporting the nest was cut off, and fixed firmly in the soil at a height of

three to four feet. On returning to the spot two days later, I was pleased to find that all had gone well. After getting the tent up it was not many minutes before a low-murmured *tr-e-e-e-e-k!* or *ze-e-e-e-t!* was heard, to which the young always responded in a similar strain. Approaching cautiously with throat loaded to the brim with choke cherries, the mother bird delivered them one by one, and then inspected and cleaned her household.

After a longer interval the pair came and stood on the edge of the nest. There was nothing in their bills, but their gullets were crammed full of blueberries, and after tantalizing the supplicating young for a moment, up went a head, and presto! out came a berry, which was quickly placed in an open throat, and passed around until it was promptly swallowed. Up went the head again, and the performance was repeated. It was like a magician shaking eggs from a bag, and there seemed to be no limit to its capacity. Many who have witnessed such actions have supposed that the old birds were attempting to distribute the food without partiality to their hungry children, but this is not the case. It is all a question of nervous reaction. The food is not simply placed in the mouth but pressed well down into the sensitive throat, which promptly responds unless the gullet is already full. The old bird watches the result intently, and if the food is not taken at once it is passed from one to another until a throat with the proper reaction time is found. The movements of the bird are so rapid, and the berry is so often quickly withdrawn, that it is difficult to make an accurate count. Usually from six to eleven blueberries and almost as many choke cherries are thus carried in the gullet. Wilson, who noticed the distensibility of the gullet of this bird, which will take from twelve to fifteen cedar berries at a time, thought that it served as a crop to prepare the food for digestion. The berries and insects, it is true, often come up crushed to a pulp and reeking with slime, but it is



Fig. 37. Tantalizing the young. The mother Cedar-bird has come with food, but hesitates to advance and deliver it. Compare with Fig. 38.

not likely that the œsophagus serves any other purpose than a temporary receptacle for the food.

When the berries had gone the rounds, both birds would suddenly leave the nest with a *whisk*. Again one would hear their murmuring call, *tr-e-e-e-e-k!* growing more distinct as they came nearer. Then both would alight on the nest rim, and stand there a moment like statuettes with heads erect. After regurgitating the food and distributing it, they keenly eye everything in the nest, snap up the excreta from each bird in turn, swallow it, and are off. The young sat or stood on the nest with heads up and all pointed one way. Presently, every black bead-like eye was alert; four scarlet-orange mouths opened at the same moment, and four necks were stretched now to this side, now to that, whence came the least sound. When their parents actually approached with their low-whispered call, they would huddle together and stretch their legs, wings, and whole bodies to the utmost. Then would arise such a chorus of supplicating cries as no parent could resist. Touch but a twig and the nest presents an even livelier spectacle. The young fairly tumble over each other, while their wings, heads, and bodies vibrate with an intensity of desire which their eager voices can only feebly express. Two days ago these young lay quietly in their nest, and when touched showed absolutely no fear, but to-day the instinct of fear had possessed them, and when approached, all hopped off the nest and hid in the grass.



Fig. 38. Female Cedar-bird prepared to regurgitate food from the gullet. Notice the outlines of the neck, which mark the full throat. "Twenty minutes later, the last fledgling had left the nest." August 25, 1899.

Another Waxwing family was discovered on August 15th, in the crotch of a witch-hazel bush seven feet up, in the same pasture with the Red-eyed Vireos whose history is yet to be told, and not many rods from their nest. A touch to the branch brought off the mother, who was brooding three tender young barely two days out of the shell.

After a short interval, during which I went to get a notebook and pencil, this bird was back again, and once more her jet-black eye and clean-cut profile appeared above the nest. I had sat down but a moment when the male flew past, and gave an alarm which brought off his mate in a flash. Both then alighted in the tops of neighboring trees, and standing erect, uttered their low responsive call-notes.

Six days later—August 21st—the bush was removed a rod away and the tent placed beside it at nine o'clock. The familiar calls of both birds were now heard and in just thirty-five minutes from the time of closing the tent a soft whirring of wings announced the mother bird, who alighted near the nest. She approached cautiously, as an intelligent bird should do, surveying the situation at every step, and finally landed on the nest. After a momentary pause she began tossing up her head and producing black cherries which were judiciously placed, one at a time, in the throats of her nestlings. Then a thorough inspection followed, and the sanitary condition of the establishment was insured by the method already described, after which the mother remained a full minute ; then with a low whistle she sped away. At her next visit she began to shield her young from the growing heat. With half-spread wings and with back to the sun the mother protected her little ones for a full hour from the broiling sun, while her mate came repeatedly and handed out the cherries.



Fig. 39. Female Cedar-bird ready to feed young by regurgitation—gullet stuffed with cherries.



Fig. 40. After feeding the young—the gullet empty. Notice the "sitting" posture, and compare curves of throat in Fig. 39.

The Cedar-bird will pant with



Fig. 41. Regurgitating food. Up goes the head, and presto ! out comes a berry.

trees, close by our house. Taking the hint I placed a quantity of red and blue yarn on the branches, and on some bean poles near the nesting site. Every thread was taken from the fir and worked into what became a very gay mansion. It was placed on a spreading apple bough, at a fork in the limb and between upright shoots, fifteen feet from the ground. The blue yarn was in excess of the red, but I am sure this meant nothing to the birds. They simply took what was provided, and had all been red, it would have been accepted.

These birds were most expeditious, for in two days the last straw was in place, and in six days from the start four eggs had been laid and incubation begun. Ten days later three of these eggs had hatched into mouth agape when uncomfortably warm, but is never seen to erect the feathers generally, as many birds do in order to keep cool. Nothing escaped that came within range of their sharp eyes and bills. One of the photographs shows the male on the farther side of the nest with cherry in beak and full neck, while the mother, with back to the camera, gives her neck a peculiar twist and looks behind her. While I was watching the performance, a bird of another species, which I was unable to recognize, dashed up, alighted for a moment on the top of my tent, and giving out a harsh chatter, disappeared.

One day in July I happened to see a Cedar-bird tugging at the frayed ends of a cord which had been fastened to a branch of one of the fir



Fig. 42. She hears a suspicious sound.

young birds, while one was addled. Born blind, naked, and helpless, the Cedar-bird begins to see when three days old, through narrow slits which gradually open, and expose the eyes to full light. When this nest was touched the young would raise their tremulous heads aloft, and with red mouths opened wide, express in silence the simple sign language of newly hatched birds. One of the brood mysteriously disappeared, so that eventually only two were raised, and this recalls the loss of a young bird from the first nest which was built by the same pair. When evil befalls a nestling, the parents either remove its body or abandon the whole family. The latter course is seldom, if ever, followed after the eggs have all been hatched.

Bough and nest in this case were removed on August 23d, when the young were between eight and nine days old.



Fig. 43. Cedar-bird listening intently while inspecting nest.



Fig. 44. Standing at inspection: a characteristic pose.

They were set up on a hillside, in an exposed position, with a house on one hand and a public drive and monument on the other, but the birds stood it well, as the photographic record shows. (Figs. 37, 38.)

Owing to unfavorable weather the tent was not used until the afternoon of August 25th. In a few minutes, the female was on the nesting bough, coming and going, but finally kept her perch and examined the situation critically. Something unusual had happened full of significance to herself and family, but it was an enigma hard to solve. Silence at last brought assurance, as it usually does in such cases. She approached nearer, pausing at every step, until she could no longer resist the magnetic influence of the calling youngsters, who fairly palpitated in their eager desire for food. At this nest

the young gave the call-notes repeatedly, but the old birds usually approached without a sound, and were never both at the nest at the same time. On the next day the mother bird was feeding the young before I could set up the tent. Both birds came frequently bringing black cherries and grasshoppers. At each feeding the following order of events was usually observed: the parent sounds the call-note at a distance, to which the young reply, but observes strict silence in drawing near; the young are fed, inspected, and cleaned; the old bird flies to a convenient perch, rubs the bill clean, plumes, and speeds off to the nearest cherry trees.



Fig. 45. Devouring the excreta: an unusual attitude.

In the course of the forenoon these fledglings became very restless, and as the heat from the sun increased, one crawled out, sat in the shadow of the leaves, and finally dropped to the grass. Here it was immediately fed, and then hopped away surprisingly fast. The male enticed it along, and thereafter took care of it, while the mother returned to her remaining nestling. Twenty minutes later, the last fledgling had left the nest, never to return, and the curtain was immediately rung down. The young had spent exactly two weeks in their temporary home, and had the weather been cooler they might have tarried at least two days longer.

At this age the crest is not very prominent, and instead of the jet-black, triangular band which surrounds the eye in an old bird, the crown of the head is encircled by a light band, passing above the eye. At the age of ten days, or a little earlier, the tubes of the wing-quills burst, and the red wax-like tips of the secondaries, when present at all, also appear, or at least did appear in the young from this nest.

When about ready to fly and waiting to be fed the young have the peculiar habit already noticed of standing erect with upturned heads. A nest of these birds, in this attitude makes a curious picture. Any danger signal is now likely to bring them off in an instant. This particular brood had their abode in a pine tree close to our house. On July 17th, shortly before the picture was made, the family of five was standing bolt upright, all facing one way, as if under military discipline. When their branch was touched all but the two shown in Fig. 117 gained the nearest trees in their first flight and escaped. This pair came to the ground, and were replaced in the nest. In their second attempt made ten minutes later, the larger of the two birds was more successful. It flew to the roof of the barn, not far above it, and after hopping to the ridge-pole, made the upper branches of a tall elm. In the larger of the two birds the black band of velvety

feathers has appeared in front of the eye and replaces the fawn-colored fillet already mentioned. This change takes place in about four days.

The fourth and in many ways the most interesting nest was built in a pine, some account of which has already been given, in illustrating the change of the nesting site. I watched these birds over ten hours from the tent, saw a great many interesting sights, and made a long series of pictures.



Fig. 46. Cleaning the nest. When the young are fed, the duty of the old bird is but half done.

The young at this nest were visited and fed forty-seven times during an interval of exactly ten hours and forty-seven minutes, on three different days. On the last day they were fed on the average once in ten minutes. The food consisted of choke cherries and red bird cherries, varied with raspberries, blackberries, and blueberries, together with insects which, during the last days of life at the nest, constituted about one quarter of the fare. At one half the number of visits recorded, fruit alone was served. From six to ten cherries were brought in the gullet at a time, and once by count eleven blueberries. Feeding was effected almost always by regurgitation in whole or part, and rarely was any food visible when the birds came to the nest. Now and then, however, a bird would approach loaded to the muzzle, with a berry or insect in the bill to round out the measure. Soft fruits like raspberries were crushed to a pulp, and insects which are commonly served with the berries, came up covered with saliva, and often in an unrecognizable state. The staple animal food was grasshoppers and I have seen the large cicada or harvest-fly brought to the nest, but never dragon-flies, butterflies, or moths. The cicada made a lively struggle for a few minutes; it was placed in one open throat after another and withdrawn eight different times, before a gullet was found capable of the proper reaction time. If a bird was slow he lost his chance, and another was tried. The key was at last fitted to the lock, and the bruised and battered cicada was taken in, but the old bird had not finished her task. She began tossing up her head and producing bird cherries. Then she gave the nest a thorough renovation. In doing this the mother often walks around the rim, and attends to each nestling in succession, sometimes even inspecting one bird more than once.

At first I found it difficult to tell the old birds apart until I noticed a distinguishing mark on the female, who had a little bare spot where the feathers had

come out, on the right side in front of the wing. This shows plainly in many of the photographs.



Fig. 47. Young Cedar-bird from nest shown in Figs. 39-46: photographed on the morning of flight, July 19, 1900. The bird was not touched, but occupies a natural perch, chosen by himself.

As I have said in another place, the female would often fly direct to the tent and alight on the end of the ridge-pole just above the nest. Here she would pause a moment, then go to her young. Should they fail to respond promptly, she gives a peculiar clucking sound, a habit common to many species, which is the stimulus applied as a last resort. At this signal every mouth is opened wide, even if the gullet is already full. Indigestible substances pass through the alimentary canal, and are never regurgitated in either young or adults.

Cedar Waxwings have been seen in the act of sipping maple sap in March, either standing near a broken twig and reaching round to pick off the drops from the underside or hovering over the spot and taking sips while on the wing.[1]

Towards the last of August, small flocks of Cedar-birds are moving about in search of food, the low murmur of their call-notes being audible for a moment only as they pass overhead. They know when the wild cherries are ripe, and never fail to visit the trees skirting the fields. The black cherry tree is a pleasant sight, when laden with the pendant racemes of black cherries, its tremulous foliage shining in the sun, with Robins and Cedar-birds fluttering about it. Every good tree is an aviary when its fruit is ripe in late summer and early autumn. Both old and young are on hand. Then you may see one sidle along a bough, stretch its neck, wag its tail, and fondle another with its bill. Their fine breezy call-notes suggest the bleating of the insects in the grass below. Tent caterpillars spin large nests in these trees, but the birds prefer the acid-bitter fruit to the insects. Occasionally a bird will leave its perch, and dive for an insect in the air with the



Fig. 48. Cedar-bird about thirty-six hours old, blind, naked, and helpless: characteristic instinctive response to any sound or vibration, as when the parent brings food, or the nest or branch is tapped. Notice that the bird rests on its pot-belly, and uses both wings and legs for support. Enlarged to life.

[1] For this note I am indebted to Mr. Robert J. Sim, of Jefferson, Ohio.

ease and precision of a professional fly catcher. I have seen the Cedar-bird either taking the spider from his web or possibly robbing him of his prey. The birds peck at the cherries, pull them off, suck up the juicy pulp, but drop the hard stone. The ground under the trees, as well as beneath their favorite perches, is covered with cherry stones. Suddenly there is a swirl of wings, and the band moves off rapidly to try the fruit in some other quarter.





CHAPTER VI.

RED-EYED VIREOS.

THE moment I touched the spreading branch of a witch-hazel bush out flew a bird, and the next instant my eye rested on the nest of a Red-eyed Vireo. It was suspended between the forks of a twig about six feet from the ground, and was well protected and concealed by the leaves. It then contained two young birds, four or five days old. After examining it carefully I retired, but before doing so fixed a cord to the branch and drew down the nest so that its brim was horizontal, and the whole about four feet from the ground, a convenient height for future study.

The young were quite naked, save for a sprinkling of light down on their heads and backs. They had yellow-rimmed bills, bright yellow throats, and were just beginning to see through the narrow vertical slits, which admit light gradually to the eyes. The old birds betrayed no unusual anxiety, but uttered their unobtrusive *piort ! piort !* and the female soon approached with an insect. This nest was surrounded by tall bushes with barely space to pitch the tent in front of it, and as I decided to make no further changes, a somewhat spotted leafy background was unavoidable in the pictures. Coming again on July 31st, the tent was soon in place. The female, who was brooding at the time, flew off quickly, but returned in a few moments.

These Vireos soon became quite unconscious of being observed, although literally as near the eye as one would hold a book to read. I spent parts of three days on this spot watching a most fascinating panorama of bird-life. On the third day the tent was moved up to within eighteen inches of the nest, but my lack of experience at this time in photographing moving objects at such close range was the cause of many failures.

On the first day it required forty minutes to restore perfect confidence, or before the affairs of the nest were conducted with their usual regularity. The young raised their heads aloft and called loudly for attention, or hung drowsily over the brim of the nest. At this time their skin was dotted with the fine rapidly growing feathers, and the wing-quills looked like slender paint brushes, having just burst the tips of the cylindrical horny tubes in which they grow.

The old birds examined the situation carefully. Their mournful *piort ! piort !* was heard again and again, the male answering his mate as she deliberately approached the nest. After advancing many times, and turning back as often through fear or distrust, the mother hopped up briskly with a bee in her beak. Her instinct to care for her young was stronger than the male's, and she almost invariably approached in the same way, by the path of the twig in the fork of which hung the nest. A smaller division in the fork gave off a still smaller branch close to the nest, and upon this the

birds always perched, and thus stood directly over their brood. Any vibration of the nest, as when the feet of the old bird touched the main stem to which it was fixed, or any sound above or below electrified the young, and up popped their heads like two jacks in a box. With mouths wide agape, they would clamor and quaver, expressing their emotions not only by the vibration of the wings but by the shaking of the whole body. But the young at this tender age are unable to discriminate with any exactness. The quivering of a leaf, or the stirring of a twig close at hand, a puff of wind, the flutter of a wing or the voice of any passing bird would throw them into the same state of excitement. But this was only for a moment. Their heads would again drop listlessly over the wall of the nest, and with open mouths, they would doze in the sunshine. Something would then suddenly arouse them, when they would instinctively go to preening themselves just like old birds, although they had at this time no feathers which seemed to need this attention.



Fig. 49. Male Red-eyed Vireo standing at nest after feeding the young. Life-Size x 3.

Quite often you would hear a *huic ! huic !* which always aroused the young, who would *tsip !* back in earnest. While the mother was again coming slowly towards the nest with a bee in her mouth, another bee happened to cross her path. She darted after it but missed her aim. Then, disposing of the first insect, she watched her young intently for a moment, stooped, picked up a small white package, and hurried away.

At one o'clock the old birds took a midday rest, and it was full twenty minutes before that reassuring *piort ! piort !* was heard. Then as, step by step, the mother came nearer the magnet, the drawing power of which was irresistible, her livelier *huic ! huic !* awoke the young, who started and replied *swit ! swit !* Thereupon the old bird quickly hopped along the branch, straddled the fork, and tucked a large grasshopper into one of the open mouths. In three minutes she was back with another, this time stopping to clean the nest again. Five minutes by the watch had passed when she returned with a brown gray-winged insect over an inch long, which an entomologist might be able to name from the photograph. She paused for a moment while the young called eagerly and stretched their necks to the utmost; then she helped the insect down the throat of the



Fig. 50. Female Red-eyed Vireo ready to deliver a large insect.



Fig. 51. Placing it well down in a hungry throat.



Fig. 52. Standing in characteristic prone attitude of inspection.

lucky bird. However, it stuck at the gullet, and the little one gulped hard before its protruding wings had disappeared.

As is well known the young bird has wonderful powers of digestion and assimilation, and after the first week the rapidity of its development becomes even more striking. A lapse of twenty-four hours now means a great stride in growth. It takes food almost constantly throughout the day, and digests it quickly, though imperfectly. The adult Vireo like the Flycatcher is said to regurgitate the indigestible parts of its food in pellets.

The male Vireo seldom came with food, and then always with an extra degree of caution. Twice he followed swiftly after his mate, acting as her guardian while she quickly went the rounds. The *rôle* of the old birds in feeding was almost invariably the same, as I have in part described. They trace a zigzag line to the nest, a straight one from it. You hear first their responsive call-notes. The mother bird with insect ready is in a bush a rod away; then she comes a step nearer, and pauses; her *piort!* is now more distinct. She slowly advances, until the twig which holds the nest is touched. Up go the heads of the young; they call aloud, stretch their necks to every side, gaze up to the clouds and around upon the leaves. Then as the mother hops nimbly along the twig, and stands over

them, what a picture of eager desire, tremulous impatience, and keen rivalry they present! The food is sometimes quickly placed in the throat of one, and as quickly withdrawn to be given to another, and when there are more than two it may go the rounds before it is allowed to remain, a common practice the true meaning of which we have already seen.

After inspection is completed and the nest cleaned, the parent bird flies to any convenient spot, carefully wipes the slime from her bill, stretches her wings, and smoothes out all the ruffles in her dress. These birds always look as sleek as a new silk hat, every feather lying smooth in its place.

One day while in my tent, a small bird of another species suddenly darted down upon this nest. There was a momentary flutter, a clash of beaks and claws, and the intruder was promptly driven away.

It was always interesting to watch the behavior of the young between the intervals of feeding. The moisture would fairly glisten in their wide-open mouths. They snapped at every ant and flying insect which came within their reach, but I never saw a single capture. The preying instinct is undoubtedly one of the most ancient among animals, and young birds peck instinctively at all kinds of small objects, but precision of aim which leads to success in capturing their prey must be ac-



Fig. 53. Male Red-eyed Vireo who is less preoccupied in performing the same duty.



Fig. 54. Female Red-eyed Vireo approaching the young.



Fig. 55. Drawing back through timidity.

quired by practice. These young Vireos would often hang their heads down over the nest, and doze until aroused by the piping of the Robin, or by the call of some other bird. Then the mother would appear, with a huge green katydid, its wings crumpled and held tightly in her sharp bill. It was surprising how quickly and gently it was assisted down one of the hungry throats.

At one of his visits the male, after cleaning the nest and young with great care, stepped in and settled down to brood. In a moment two downy heads shot up from under his breast, and I regretted that my camera was not loaded at the moment. He showed unmistakable signs of displeasure or uneasiness, repeatedly erecting and lowering his crest, and puffing out his throat. With mouth wide open he gazed keenly about him, and after a few moments dashed off as if in pursuit of an enemy.



Fig. 56. Bending over to feed young.

When a large grasshopper which had been given to a young bird had made good its escape, the mother darted after it, seized it before it had touched the ground, and you may be sure that there was no possibility of escape this time. A grasshopper was sometimes divided between the two young, but usually a single bird only was fed at a time. The male warbled his pleasant strains from a branch hard by, while the mother hunted for insects in the grass below. A large brown locust with yellow and black wings was soon brought in. The adult Vireos glean most of their animal food from the foliage and, as might be expected, are great caterpillar destroyers, but while feeding their young, I frequently saw them exploring the grass as any Robin or Song Sparrow might do, snapping up every insect which came in their path.

On the third day, when my tent was but eighteen inches from the nest, the old birds came to it even more readily than before. They would still occasionally start at the click of the shutter, but they did not mind the shrill scream of a locomotive across the river, or the rumble and splash of logs which were momentarily being set free and sent tumbling headlong down a steep slide into the river below. They had become used to these sounds and had learned from experience that they were harmless. On this day, a great change seemed to have come over the young. They had become almost transformed in appearance, and were very restless. Their bodies were now well covered with feathers, and they were beginning to show the first traces of fear. Their snow-white breasts gleamed through the thin walls of their cup-shaped nest, or from over its rim. Grasshoppers, katydids, green larvæ, beetles, and bugs of many kinds were served again and again, but it would be a mistake to suppose that there was no fruit to vary this diet. Upon the third day the mother brought a ripe red raspberry, its juice fairly streaming

down her bill, and after a few beetles had been taken, she appeared with a large blackberry. Fruit was served to the young about half a dozen times in the course of four hours during which watch was kept on this particular day, but I had not seen a single berry brought to the young before this time.

On the first two days of observation the young were fed on the average of once in fifteen minutes, but upon the third day food was brought every nine minutes.

Hitherto I had taken pains not to touch the nest, but as I approached for a final look at the young at about two o'clock they immediately took alarm, and popped out one at a time. The larger of the two disappeared, and was never seen again by me, and although I replaced the smaller bird in its nest time after time, it positively refused to stay. Like the young of so many wild birds, when once they have tasted the freedom of the world, they seem to look with disdain upon their old home. Although these birds could only flutter in their first attempts at flight, they could hop nimbly from branch to branch, and thus ascend readily to the tops of high bushes.



Fig. 57. Inspecting cautiously. Compare such attitudes with Figs. 50–53, which express no fear.

Upon visiting the site of this nest on the following day one of the young birds was discovered in the grass less than two rods from its empty nest. It was calling loudly for food, and the old birds were tending it. A few hours later I returned in the nick of time to save its life by the capture of a large garter snake which in some way had discovered its opportunity.

During the past summer, a Vireo's nest was found on the twenty-eighth of June, when the female was incubating two eggs. Her plans were, however, suddenly interrupted, apparently through her own carelessness. A storm soon ripped up the nest, the walls of which were unusually weak and fragile, and the eggs were spilled. This nest was apparently the first of the season, and might have represented the first attempt of a young bird. There is the possibility, however, that this was really a second and hurried attempt at nest-building, due to a former accident.

The snow and storms of winter usually knock the bottom out of the Vireos' pendant nests, but some remain whole for over a year. Wilson speaks of finding the nest of the Yellow Warbler built inside of an old Vireo's nest. The deer mouse sometimes takes possession of an abandoned nest in fall, and converts it into a snug globular house for itself and young. I remember the feeling of astonishment which the discovery of one of these converted nests gave me when a boy at school, and of wondering to what animal those black lustrous eyes, which appeared at the entrance, could belong. In this case the original framework was concealed by a symmetrical dome of thistle-down, a substance

used also in lining and covering the original walls. There was a small round hole or side entrance, just above the old rim. When disturbed this sleek little mouse left its warm house, ran down the branch and disappeared.



Fig. 58. Young Red-eyed Vireos from the nest shown on page 68. No. 12 of table, p. 11.

CHAPTER VII.

THE NEST-HOLE OF THE BLUEBIRD.

THE mellow note of the Bluebird is a welcome sound on March mornings when the air is yet wintry, and the snow stands deep in the woods. Its meaning is unmistakable, but to appreciate it, one must live in the North where spring means literally "turning over a new leaf," a new order of existence. Should cold weather or heavy snows return, the birds retire for a time, but promptly re-appear with better days.



Fig. 59. Female Bluebird taking a look outside, as if hesitating, before going in search of food.

Robins, Song Sparrows, Bluebirds, and Phœbes all arrive from the South during the latter part of March, and the personalities of these birds are too well marked to be mistaken. On March 24th, I heard a bird calling from a distant apple orchard, when it presently flew in my direction, alighted on an elm beside the road, and repeated its low sweet call-notes again and again. Through the mist not a feather could be seen, but there was no mistaking this plaintive voice. Five days earlier in the month the Bluebird was seen at Northfield, thirty miles to the south. The males are first to arrive, coming singly or in small straggling companies. As we walk along the desolate country roads, they rise from wall and fence-row, displaying their brilliant azure wings, or when flying overhead the cinnamon brown and white of their under plumage. Their almost ventriloquial "*phee-ur*" note which is heard as they fly is not peculiar to any season.

When the females come a little later, the males are in full song, and the period of courtship, which is very ardent in the Bluebird, begins. The affection and gallantry of

the Bluebird have aroused the enthusiasm of many observers. Unfortunately, we are obliged to add that a case of polygamy in this species has been reported.[1]

The choice of a nesting site is made with great care and deliberation. If they accept the house or box prepared for them, they often have to defend it against the Wren, the Martin, and the House Sparrow. Wrens and Martins are easily driven off, but the pugnacity of the Sparrow, and the greater numbers which he can usually muster render all resistance hopeless. An abandoned Woodpecker's hole is not disdained since it forms a safe, cozy house which needs little furnishing. This snug cavern is sheltered from sun and rain, and secure from most birds and beasts of prey. The rotten fence-post, and the many holes in the decayed apple trees may also contain the secret of the Bluebird's nest.



Fig. 60. Female Bluebird carrying grasshopper to young.

On August 11, 1899, I saw a pair of Bluebirds paying marked attentions to an old "auger-hole" in an apple tree, made by Golden-winged Woodpeckers. It was plainly a case of nest within nest. The female was carrying insects to her invisible young, which I supposed at this late date were ready to fly, but, as it afterwards appeared, they were only five days old. This hole had been nicely drilled beneath the springing branch of a truncated and now dead prong of the tree, fifteen feet from the ground.

When the opportunity first offered on August 15th, I sawed off the limb, two feet from the opening, and set it up in a convenient spot fifty feet away. It was so arranged that the whole trunk could be rotated, and the circular entrance of this nest turned directly to the sun at any time of day. I had barely left the place to fetch the tent when the mother bird flew from the apple tree to the stump, entered the hole, and having fed the young, came out with a small, white parcel in her bill. This bird had her eye on the nest, and was ready to visit it in its new situation, when free to do so. The tent was placed two feet away, but later drawn up to a distance of about eighteen inches. After concluding these operations, I had to wait longer for the parent bird to come again. When one considers that the nesting branch was suddenly moved fifty feet from its original position and

[1] *Bulletin Nuttall Ornithological Club*, vol. viii., p. 63.

fixed on the ground, and that a tent was then pitched so close to it that the birds could not fly straight to the entrance but had to flit first to the trunk, and then go around to the hole, it is not surprising that they held aloof. I waited exactly one hour and twenty-five minutes before the mother again brought food to her young. Meanwhile it was interesting to see what was happening, from a peep-hole of the tent. Both birds would fly to the tree which they had known as their home, and mechanically go through their usual motions in approaching the nest, hopping first to this branch, then to that, following a well-defined path, which they had traveled hundreds of times, and finally hover over the spot which was once occupied by the nest, as if to become assured that their eyes had not deceived them.



Fig. 61. Female Bluebird about to enter nest-hole with green insect-larva.

These actions were repeated by both Bluebirds many times, while they uttered their responsive *pheer* note. Again, calling eagerly, both would fly towards the new position of the nest. Finally, the female, who in this case assumed the whole task of feeding the brood, came to the stump, paused a moment, quickly entered the hole and came out in hot haste. The absolute stillness, however, had restored confidence, for in five minutes she returned with a huge green grasshopper and in ten minutes was back again with another. In the course of each visit the plaintive call would announce her presence as she approached with insect in bill, and alighted on a half-dead peach tree close by. After a momentary survey of the situation she would flit to the stump, sit for a few seconds on a dead branch at one side, then hop down, fly to the hole and catch on the bark or cling to the rough edge of the circular opening with her sharp claws, pausing there a tenth of a second, or long enough to cast a swift glance backwards. In this position she was photographed many times, with grasshoppers, crickets, green larvæ, katydids, and once with a large robber fly in her beak, the profile of her head being sharply vignetted by the dark circular entrance. The young must have been all a-quaver at the sound of their mother's wings, for the old stump seemed to become suddenly alive with brisk chirping sounds the moment she touched any part of it. The bird used her tail to



Figs. 62, 63, 64. This series represents the Bluebird engaged in cleaning her nest on three distinct visits, at each of which food was served. Nearly one half life size.

help support her weight against the side of the tree, like a Woodpecker, and I noticed that the tail feathers were frayed and worn at the points.

The male during the numerous visits which followed came two or three times and sat above the door, but never actually entered it, and never brought to the young a single morsel of food in the course of the entire day. He would warble very sweetly, however, and probably encouraged the exertions of his mate. The next time this bird appeared with a grasshopper she did not trust herself inside, but stood at the entrance, put her head in and as quickly drew back to take another glance around, then leaned far down and fed her clamoring brood. When she came again, I made a picture of her as she stood at the hole, and in so doing frightened her off, but she was back in an instant, and another picture was secured as she left the nest. At this moment a flock of Goldfinches flew overhead, and were heard calling *be-be ! be-be !*, at which the young Bluebirds were instantly aroused, and made the old stump resound again with their cries. After many grasshoppers and crickets had been dispatched, a hairy robber fly, or *Asilus* already mentioned, was brought in. Then another bright green katydid, with its wings half spread in its vain effort to get free, was served to the young. If frightened in an attempt to enter the nest this bird invariably returned shortly, and after the feeding was over, would take the excreta, and fly some distance before dropping it. In no case was it known to be eaten at the nest. During the afternoon, when these birds had become more at ease

in their new surroundings, the nest was cleaned six times in two hours. I saw this bird bring to her young no less than twenty grasshoppers, four cone-headed katydids, two black crickets, besides larvæ and many small insects. During the forenoon, in the space of nearly three hours, the young were fed on the average of once in six minutes, and for two hours in the afternoon once in nine and a half minutes.

The history of this interesting nest came to an unfortunate close, though through no fault of mine. The old birds were subsequently frightened away, and their five young ones left to perish. The young were not quite three inches long, and less than a week old. They had yellow skins, and bright yellow mouths, and there was a sprinkling of plumbeous down on the head, back, and shoulders.

Toward evening on March 22d of the present year I saw a male Bluebird sitting comfortably in an old Robin's nest, having apparently settled down to spend the night there.

The Bluebird is one of the most unobtrusive of wild birds. It goes about its business quietly, and seems never to fight, except in defense of its home. According to one authority, there are usually three broods, and before the first set of young can shift for themselves the female repairs the nest and gets ready for the second. The male continues to care for the first brood after the second has appeared, will feed his mate, and even take her place at the nest.



Fig. 65. Standing at entrance with large grasshopper in bill.

CHAPTER VIII.

MINUTE OBSERVATIONS ON CATBIRDS.

WHILE the Catbird has a strong attachment for its young, especially during later days of life at the nest, when any intrusion will arouse its fighting instinct to the highest pitch, it is under ordinary conditions exceedingly wary, suspicious, and hard to approach. In the account which follows I shall describe only what was seen while camping beside two nests of these birds.



Fig. 66. Female Catbird bringing in a large limp dragon-fly —the *Aeschna heros*.

The first of these attractive nests rested on a spray of the sweet viburnum, in a little clearing in dense bushes, and about four feet from the ground, so that no change in its position was necessary. It contained a single addle egg and two young with the feather-shafts of the wings barely exposed.

For an hour or more after the tent was in position, the old birds kept up a perpetual din, in which their exasperating *tshaying* note was most pronounced. They would circle round and round the tent, often coming close as if to discover the way in, or fluttering and screaming at it, as if it were a demon to be exorcised. After this they gradually became more quiet, and began to alight on the tent's guys and roof. At last the female was seen stealthily to approach and quickly feed her young. After a fresh reconnaissance both birds went to the nest together and with rapid, jerky movements stuffed red cherries into the hungry throats, inspected and cleaned each young bird, and then darted away.

While in a state of mind wavering between fear and assurance, the Catbird

passes rapidly to a branch, and spreading and pumping the tail pauses in an attitude of attention before making another movement.

Both birds now began to bring an abundance of insects and fruit, as if making up for lost time. The female came with two cherries in her bill and promptly gave one to each of the two birds. Then a grasshopper was served, and still again a dragon-fly, with blue body and spotted wings (the *Libellula pulchella*). The insect was swallowed wings and all, but only after prolonged efforts. As confidence was gradually regained, the birds would remain longer and longer at the nest, pick the young all over, and clean everything with care and deliberation.



Fig. 67. Female Catbird inspecting after having fed the young.

At this time (July 23d) the young were about eight days old, and could be easily approached. Two days later when their nest was touched, they tumbled out in an instant, disappearing as if by magic amid the leaves. I succeeded in finding one of them, but it refused to remain in the old nest. Its wing-quills now showed a half inch of the feather-shaft, which represented two days' growth, while the tail feathers were still in the stub-brush stage.

There were four young in the second nest, which was discovered in some bushes close to the river bank on the nineteenth of June. It rested in the crotch formed by the crossing of shoots of the dogwood and alder. The young were in pin-feathers, but not a tube had burst. Both old birds happened to be off foraging, but quickly returned with food in their mouths, and began to alarm the neighborhood.

The tent was pitched in front of this nest at eight o'clock on the morning of June 23d. After it was closed both birds began their cautious explorations in the vicinity, *tschaying* incessantly and with nerve-rasping vehemence. A male Redwing Blackbird was soon attracted to the spot, and added his note of alarm to the general outcry, but after finding that the matter did not concern him, returned to his nest in the flags farther away.

In twenty minutes the Catbirds had become more quiet, and began to pay close attention to the tent. The Redwing was heard *con-quer-ee-ing* in the distance. Song Sparrows were singing merrily. Veeries called from the woods close at hand, and the

be-be of the Goldfinches could be heard as these birds passed leisurely overhead. The conditions were all reassuring, and presently the Catbirds became silent, and went off for food. In a few moments a rustling of leaves was heard close to the tent and the male could be seen coming boldly in its direction.

Up to this time the young lay quietly in the nest, but were alert to every sound, whether from the wind or any passing bird. Their wing-quills had become exposed in the course of two days to a length of three quarters of an inch.

Suddenly a jubilant song burst forth from the throat of the male, and his mate thus encouraged approached the nest with insect in bill, but her fears were not allayed, for after beating about she swallowed the insect herself and went in search of another.

The young now began to yip in earnest and to stretch their scantily feathered transparent necks. One of the lustiest of the four even climbed to the edge and sat in the shade. They would erect their scanty crest-feathers and pant in the sun, which though not excessively hot, was with the added feeling of hunger, beginning to make them restless.

The sense of fear was at last overcome in the mother, who came, fed and cleaned the young, and flew off again. After another pause a huge dragon-fly was brought to the nest. The observer had to wait long at the beginning, but his reward was now quick in coming. The young were then fed every five or six minutes, but the male only rarely went to the nest himself. Still cautious to a degree, he would follow after the female, but stop a few feet short of the nest. Then after delivering her insect she would go at once to her mate, take the food from his bill, and bear it to the young.

The following table gives the number of visits at which food was brought during eight consecutive hours from 8 A.M. to 4 P.M., and illustrates how the parental instincts, aided by habit, gradually overcome the feeling of fear in a very shy and suspicious animal.

HOUR.	NO. OF TIMES YOUNG ARE FED.	NEST CLEANED.	REMARKS.
1 } 2 }	1	1	Young fed by female.
3	1	..	" " " "
4	5	1	" " " "
5	8	2	Young fed once by male.
6	10	1	Young fed twice by male, who also brings food which female delivers.
7	11	3	Old birds begin coming to nest together.
8	17	4	Young fed twice by male, who also brings food for female to serve.

Five times in rapid succession the mother brought in dragon-flies of extraordinary size (the large *Æschna heros*), of a light greenish yellow color, and limp as wet paper, having just issued from their pupa cases. This bird presented an interesting sight as she approached with one of these long insects hanging from her bill, for she always held them by the head. The dragon-fly was as long as the young bird, but it was invariably swallowed wings and all, though only after a hard struggle.

The young, always on the alert huddle to this and that side of the nest, and stretch-

ing to the utmost limit their transparent red necks display the yellow target of the open mouth as they *tsit ! tsit !* to the approaching mother, who sounds her well-known call.

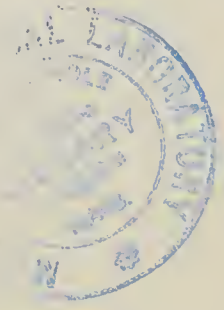
On one occasion I saw the female deliver a black dragon-fly, and afterwards take from the bill of the male, who was standing near, a carrion beetle, and pass it to the young. Then keenly eying her brood, she deliberately bent over, and as the body of one was raised took from it a small white package and flew away. Many of the photographs show the birds performing this sanitary act, a practice common to many other species. During her first visits the female ate the excreta, but thereafter it was invariably removed from the nest.



Fig. 68. Female Catbird cleaning the nest.

The food served to these young Catbirds consisted of dragon-flies, which were brought to the nest thirteen times, insect larvæ, beetles, moth millers, and a great variety of smaller insects, varied with liberal courses of strawberries. At first the old birds approached quietly, fed their young hurriedly from the farther side, and were off in a few seconds, but as confidence in their surroundings was gradually restored, they would come to the nest-front, with the camera but three feet away, remain there for a full minute, and after assisting the young to dispose of their harder subjects, inspect everything with the greatest care.

When this nest was visited two days later the young looked bright and hearty. They were now in full feather, and about ready for flight. When the tent had been cautiously set up, I noticed that a number of leaves cast undesirable shadows on the nest. Though knowing well what to expect, I decided to take the risk, and reached out to cut them off. This was the fatal spark which fires the train of gunpowder, for all went off in an instant in a panic of fear, and the game was up, for Catbirds when well out of their nest at this stage are out for good.



CHAPTER IX.

THE REARING OF THE NIGHT HAWK.

IN crossing a clearing one day in June I flushed a Night Hawk, who showed by her behavior that the little depression from which she rose contained something of great interest to both the bird and myself. She was indeed incubating a single marbled gray egg, which lay on a marbled gray patch of earth still covered with ashes and cinder. The bird retired quietly, dropping with a thud to the ground a few feet away.

Two days later, if my estimate is correct, a young Night Hawk cracked his shell neatly in two and emerged to the light of day. When first seen on the twenty-sixth of June, he was well clothed in down, and looked like a little flattened ball of fluffy worsted, of a dark cream color mottled with brown, colors which harmonize well with the usual tints of the soil. You had to look a second time to detect the stub of a beak at the base of which the large round nostrils were sufficiently prominent. Whenever this bird was aroused from its all-day slumbers the eyelids would gradually open and disclose a pair of large, soft, deep blue eyes, the lower lids showing decided angular contours which became more striking as the bird grew.



Fig. 69. Night Hawk and eggshells from which it emerged. Three days old, June 27, 1900.

The mother brooded during the heat of the day or sat as if dozing beside her charge. When surprised at such times she rose and with feathers erect and tail spread fluttered off in a slow shambling manner as if to encourage pursuit. With her feathers raised and her huge mouth wide open or the mandible vibrating up and down, with an audible snapping sound, as if set on springs, this bird presented a curious appearance, recalling the not wholly dissimilar behavior which eagles display when stirred by similar emotions.

When the young Night Hawk is exposed to a hot sun, its lower jaw also begins to vibrate but at a much higher rate of speed, when it will toddle off and crouch in the shade of a leaf. It begins to walk when three or four days old, but rarely emits a sound, except under circumstances which will be presently described. Fearing lest the old bird should entice it away, I coralled it in a small enclosure of wattled twigs on July 3d. In this pen it remained a week longer or until able to fly at the age of about eighteen days.

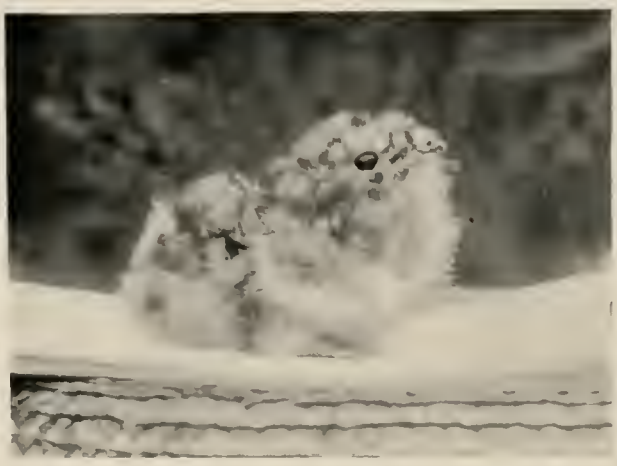


Fig. 70. Night Hawk three days old. Nearly life size.

Wishing to witness the feeding habits of these birds, which I believe have never been described, I spent parts of three days and nights camped beside the enclosure and was the witness of some interesting and curious sights. On the first day I set up the tent at three o'clock in the afternoon, but heard no sound for an hour, when the young began to *pe-up!* At five o'clock the *pisk!* of the male sounded for the first time. During the interval a single incident occurred to vary the monotony. A green snake in the course of his rambles had discovered the young Night Hawk, and when first seen was watching the bird intently from a stump close to the tent. The snake after remaining with elevated head keenly eying the bird for a long time, slowly advanced, putting out his tongue, but when a few inches away hesitated again, and as if deciding not to experiment further, turned to one side and disappeared. The bird paid no attention whatever to the advances of the snake. At this juncture I left the tent for an hour, returning as the sun was setting at half-past seven o'clock.



Fig. 71. Night Hawk nine days old, July 3d. Length in sitting posture, 3¼ inches.

At dark a change begins to come over the Night Hawk family. The young bird shows signs of life, moves about calling for food, and grows livelier as the darkness increases, making a sound like *pe-ur! pe-up!* Both old birds are now alert and gyrating overhead. You hear their *pisk! pisk!* and the startling sound caused by the vibration of the wings

as an old bird descends like a bolt toward the earth. As these sounds increase with their nearer approach, the nervous excitement of the young is curious to behold. He is all a-tremor, moves now in one direction, now in another and his *pe-ur!* note reaches a pitch unknown before. Presently you hear a thud as if a clod of earth had dropped. Then the mother bird, crawling over the leaves, begins calling *ke-ark! ke-ark!* This sound however uncouth to the human ear, corresponds to the *cluck!* of the hen to her chicks, and awakens an immediate response in the young Night Hawk. He does his best to go to his mother, but the obstacles being insurmountable, she comes to him. She is loaded with fireflies, and as her great mouth opens, you behold the wide jaws and throat brilliantly illuminated like a spacious apartment all aglow with electricity. With wings erect and full-spread, the old bird approached to within fifteen inches of my hand, making an electric display at every utterance of her harsh *ke-ark!* Then standing over her young, with raised and quivering wings, she put her bill well down into his throat and pumped him full. His down-covered wings were also spread and a-quiver. In this position they remained interlocked and silent for one or two minutes. When the feeding was over she tucked the little one under her breast and began to brood. It was not long before she was off again in the darkness, and upon returning the performance was repeated,



Fig. 72. Night Hawk twelve days old, July 6th.



Fig. 73. Night Hawk sixteen days old, July 10th. Length in sitting posture, 4¾ inches.

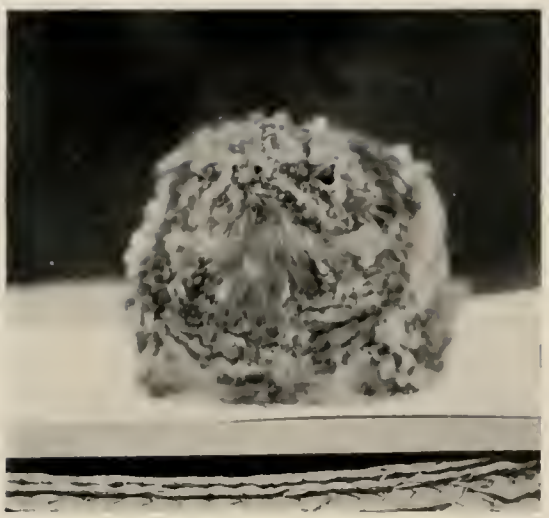


Fig. 74. Front view of bird shown in Fig. 72.



Fig. 75. Young Night Hawk in enclosure on spot where it was born, and where it remained until able to fly when eighteen days old.

after which she settled down to brood as if for the night. This young bird was fed but twice each evening between the hours of eight and nine o'clock, and always, as I believe, by the female. It is probable that another feeding time also occurs at dawn. During the earlier hours the male would sometimes swoop down with terrific wing-blast as if to drive away intruders, and he once came and sat by his chick for ten minutes after dusk without causing any excitement. The task of feeding was borne by the mother, and her presence never failed to excite the young.

I tried to make a flash-light picture of the old and young bird interlocked in the feeding process, and could easily have succeeded had my lamp been of a kind which showed no light before the flash.

In two weeks the mottled down of the Night Hawk chick has given place to mottled feathers, in which the tints range from dark to light brown or buff. The wing-quills are almost black with buff edges. The fifth quill or primary has a pure white transverse spot near the point of emergence from the feather tube, the first trace of what becomes a conspicuous mark on the wings of an adult bird. The fledgling is more lively in the daytime, runs about easily, will utter his *pe-ur!* note, and can fly short distances.

CHAPTER X.

THE KINGFISHERS AND THEIR KING ROW.

THE Kingfisher has a strong attachment for particular nesting places, and will occupy the same bank for years, if unmolested, and sometimes even when robbed. The Belted Kingfisher, though widely distributed, seems to be nowhere very abundant. In New Hampshire one rarely finds more than a single pair nesting in the neighborhood of any village or town.



Fig. 76. Tunnel of Kingfisher—the opening seen at the right—in sand bank overgrown with pines, beside country road. August, 1899.

The nest now to be described was drilled into a sand bank beside a country road. It had a straight four-inch bore, which four feet from the opening expanded into a low-vaulted chamber six inches high and ten inches across. When this dark subterranean abode was opened at the rear, on the nineteenth day of July, 1900, I put in my hand and drew forth in succession five very strange looking creatures. They had huge conical bills, short legs, and fat squatty bodies, which bristled all over with steel gray "quills," the feather tubes, which had not yet burst, suggesting an antediluvian monster or reptilian bird on a reduced plan.

These five young Kingfishers which were then about nine days old had



Fig. 77. Nest in same bank as shown in Fig. 76, and probably belonging to same pair. Taking fish to young. July, 1900.



Fig. 78. Kingfisher backing out of tunnel. The sand streams from the opening at every entrance and exit.

already acquired some curious habits. They, like the adult birds, stand not on the toes simply, but on the whole tarsus, which corresponds to the scaly part of the leg of a fowl, so that the "drum-stick" rises from the heel. They can be posed in any position like toy soldiers, but if placed in line they will soon break ranks and walk backwards, even moving up inclined planes or against obstacles set in their paths. They are rarely seen to take a single forward step for many days after reaching this stage.



Fig. 79. Five Kingfishers from chamber at end of tunnel; nine days old. July 19, 1900.



Fig. 80. Posed in line,—biting, pulling, and crowding one another.

The human infant and vertebrated animals generally instinctively walk forward; how then does it happen that the young Kingfisher early acquires the grotesque habit of walking backwards? The anomaly is readily understood. From the time of birth the young lie huddled in a cluster in their dark underground chamber, which opens to the outside by means of a single narrow tunnel. As they grow in size and strength the monotony of sitting still, often with legs and wings interlocked, must become very great, and whether for diversion or not, at all events they soon begin to bite and tease one another like young puppies. Should one be hard-pressed, the only way of escape lies along the narrow passage, which they naturally traverse head first; but the instinct to return to the warm family cluster is strong, and to do this they are obliged to walk backwards. Again when the rattle of the *alma mater* announcing the capture of another fish is heard, each struggles to get down the narrow passage-way first, but when the parent enters the hole she hustles them all back. With each backward movement the young Kingfishers thus come to associate pleasant things,—food and warmth. Thus the habit is temporarily fixed.

Wishing to see these birds take fish to their young, I decided to try the tent, although it was impossible to get nearer than eight feet, and the hole was in full light for only a part of the forenoon; besides, being situated on the roadside, one was in constant danger of interruption. The experiment succeeded, however, even better than I had

anticipated; ten visits were recorded, and the old birds were photographed in the act of both entering and leaving their tunnel. They brought a single fish each time, usually what appeared to be a small chub or dace, and I once recognized a good-sized sunfish.

When the tent and camera were ready at nine o'clock on the morning of July 23d, the parent birds were away on a fishing excursion, and did not return for half an hour. At last a series of warning rattles, at first faint, but momentarily becoming more shrill, announced the approaching bird, who came at full tilt with fish in bill. Hesitating at sight of the tent she perched on the dead limb of a pine, flew to and fro from one side of the road to the other, and made the woods resound as never before. Even the depths of the earth seemed to respond, as the muffled rattles of the five young Kingfishers issued from their subterranean abode. From whatever point of view we regard this singular note, it certainly carries well and is admirably adapted to arouse the fish under water and the young bird under ground.



Fig. 81. The "King Row." Five Kingfishers in line, illustrating habit of sitting still. July 19, 1900.



Fig. 82. The "King Row" at a later period; thirteen days old, July 23, 1900.

When the wriggling fish nearly slipped from her grasp, the bird would shift it about until her forceps had a firmer grip at a point just back of its head. At every reel of the rattle, each of which seemed more shrill and more impatient than the last, she would start as if to go to her nest a few yards away. Occasionally a peculiar creaking sound escaped her, suggesting the grating of dead limbs when swayed by the wind. Suddenly with rattle in shrillest crescendo she bolted straight into the hole, delivered the fish, remained for half a minute, then came out backwards, turning in the air as she dropped from the entrance, and with a parting rattle was off to the river. During these visits the Kingfishers usually remained but a quarter or half a minute in the tunnel, and always came out backwards,

except on one occasion when I saw the bird turn near the entrance, and shoot out head first. The longest visit recorded lasted three and a half minutes. When a youngster was encountered near the mouth of the tunnel he was driven back to the chamber, where the food was distributed. Once only did I see an old bird pause at the entrance for a hasty glance backward, and thus give a good profile view of head with fish in bill. Unfortunately the plate had already been exposed, and before it could be changed, the opportunity was lost. The old birds, however, must have often turned about at the entrance on both entering and leaving the hole, as shown by the deep furrows plowed by the bill at either side of the opening.



Fig. 83. Kingfisher nine days old, showing feather tubes and tracts.



Fig. 84. At thirteen days; many of the feather tubes burst. The blue-black, white-tipped wing-quills project half an inch. Notice that these birds always stand, not on the toes only, but on the short shank or tarsus.

When the young are ten days old, the feather tubes have begun to burst at the tips, and their horny substance is gradually shed in the form of powdery scales. The feathers grow slowly, but at the age of two weeks the characteristic colors of the adult are becoming apparent,—the slaty-blue of the upper parts, and the white of the breast which is traversed by a bluish-brown belt, with rusty brown along the sides. As they rattle when taken from the nest their whole body quavers. They will hiss, bite one another, huddle together, and erect their crests of long stiff feathers. They attain to full plumage or nearly so when three weeks old, at which time their bright fresh colors and docile natures make them most attractive. They can fly but little, and show no fear. At this stage their habitual expression suggests a peculiar sardonic grin.

On the fourth of August I took these birds home in a basket, when twenty-five days

old, if their age was correctly estimated. They were about ready to fly and would have voluntarily left their nest in a short time. The nesting chamber had been gradually opened up in front and filled at the rear, until it had advanced a foot and a half toward the mouth of the tunnel. At this time fear was possessing them, and a day later it was impossible to handle them without throwing them into a panic. When quiet they would still pose well, would strike with open bill, and walk backwards.



Fig. 85. Kingfisher fifteen days old, with nearly all feathers partly unsheathed. July 25, 1900.



Fig. 86. At eighteen days. The bright blue tints of the upper parts, and the white and chestnut bands around the neck and breast are now very prominent. July 28, 1900.

During captivity I fed them on fish which, however, they would never seize of their own accord. It was necessary to open their bills and press the food well down into their distensible throats. They would perch on a branch placed in their cage, drink water and sit in it by the half-hour, but never touch the most tempting morsels of food. Raw meat was rejected, but they throve on fish if fed by the hand. When perched they stood as before on the whole tarsus or shank, and would sit together and in silence, with breasts thrown out, for hours. You heard only an occasional rattle, and that usually in the morning. The Kingfisher's œsophagus is very distensible and the throat is lined with inwardly projecting papillæ, so that when a fish is once taken in the throat, it is impossible for it to escape.

The bill of the Kingfisher is grooved on the inside, thus giving the mandibles sharp cutting edges and a firm gripe on the prey. A fish once seized rarely makes its escape, to prevent which the bird has other resources. I once saw a curious trick performed by a Kingfisher, who having made a good capture, was perched on a dead tree over the water. In the course of its struggles the fish nearly got free, and for a moment was held only by its tail. The bird with a quick movement of the head tossed the fish in the air, and as it descended caught it by the head and proceeded to swallow it.

When liberated on August 12th, at the age of thirty-three days, the young Kingfishers were suddenly thrown upon their own resources, and it was questionable whether they would be able to recover the instinct to seek and capture prey. However, they were strong and healthy, and I hope that nature came to their aid not only in prompting them to find food, but in starting them south later in the autumn.



Fig. 87. Kingfishers twenty-two days old. Placed in line to illustrate habit of walking backwards. The second bird at the left has already broken ranks and taken a few backward steps. August 1, 1900.

CHAPTER XI.

CARE OF YOUNG AND NEST.

I.

BROODING AND FEEDING THE YOUNG.

WHEN the callow young are hatched, brooding is the order of the day as well as of the night, and in some species the young seem to require this kind of protection as much as food. During the first days of life in the nest it is not easy to distinguish a brooding from a sitting bird, but this is not the case when a little later the mother begins to rest her wings over the rim, or spreading wings and tail stands astride the nest with back to the sun. The young must be protected from heat, cold, and rain, and the instinct to perform this duty is as strong with old birds as that of bringing food.

Cedar Waxwings and Kingbirds which I have watched, brooded regularly at night, but I have known young Robins to be left alone in the nest. Should the day be cloudy but with no rain, or sunny but not too warm little or no brooding has been observed among the various species which I have studied, but let the sun beat relentlessly upon the young, or the air become laden with moisture, and the faithful mother is promptly at her post. I have seen the Robin brood the young when eleven days old for forty minutes at a time, while her mate brought an abundance of food. As he approached with an insect or cluster of worms, she would step aside, but immediately settle back on the nest when the food had been safely disposed. As a rule, however, she would brood for five or ten minutes, leave at the approach of the male, return promptly with food, and brood until her mate again appeared. I have on several occasions seen a brooding bird leave the nest when the sun became temporarily obscured and return when the clouds lifted. It was not quite certain, however, that the element of chance did not vitiate the observation.

While camped beside a nest of Brown Thrushes whose photographs are shown, and whose young were approximately four days old, the female came to the nest for inspection frequently on the first day of observation, and brooded intermittently, but fed her young only once in the space of three and a half hours. When I frightened this bird off with the hand stretched through the tent-window, she would dart at it, scold emphatically, but in a few moments return to her brooding again, as if her young required this attention more than food.

The Chestnut-sided Warbler who is represented in many characteristic attitudes



Fig. 88. Female Brown Thrush brooding her young. Lens, Extra Rapid $9\frac{7}{10}$ inch; speed, $\frac{f}{8}$; stop, 32; time, $\frac{1}{5}$ second; plate, Seeds' No. 27 "gilt edge"; distance, four feet; in full sun. July 13, 1900.

about the nest by a long series of photographs, only a few of which can be shown, was a most devoted brooder for days. She would stick to her charge until driven off by sheer force or by hunger. I have often seen her drop down in the grass, pick up a morsel on her own account, and be back to the nest in a fraction of a second before the insect was fairly swallowed. Again she might leave the nest twenty times in the course of an hour to procure food either for herself or her children. Her mate would often alight above



Fig. 89. Female Robin brooding: a characteristic attitude when alert, or listening to any unusual sound.

the nest, bend far down and deliver the insects into the mouth of the brooding hen, who would promptly hop up and give every morsel to the young.

This little warbler would sometimes sit well down in the nest, and erect some of her feathers and apparently inflate the throat so that the bird's head appeared as if swollen to twice its natural size. She made the most comical picture, however, when on a hot day she stood or sat over the young, with every feather erect, striving to keep them cool and to be comfortable herself meanwhile.

The female Kingbird broods constantly when the heat is severe, and at the approach



Fig. 90. Female Redwing Blackbird placing food in the throat of a nestling.



Fig. 91. The same bird watching the food in the throat. If not immediately swallowed, the insect is withdrawn and passed around until a bird with the proper reaction time is found.

of the male will often assist in dispatching unruly insects and in seeing them safely down a responsive throat. The persistence of the Redwing Starling in this line of conduct is admirable. I have seen one of these birds stand with drooping wings, erect feathers, and mouth agape, in the strong heat of a July day for hours though not continuously, for she invariably left at the approach of her mate for a few moments' respite, and then usually returned with food.

The Cedar-bird gapes persistently when uncomfortably warm, but only the crest feathers are ever erected, and then not to the extent usually shown in drawings of this species. Both Robins and Catbirds bristle up when their nests and well-fledged young are assailed, but I have never seen this habit in the brooding bird, although their emotion is often expressed by raising the feathers of the crown.

The duty of brooding rests mainly with the female in our common land birds, but the male in some species either regularly or intermittently takes his turn at the nest.

Passerine birds feed their young at brief intervals from early morning until nightfall, but apparently seldom if ever after dark. The Night Hawk, as has been seen, broods by day, and feeds its young at dusk, or just after dark, and probably again at dawn. Both sexes usually share in bringing food to the nest, but this rule is by no means universal.

The young require animal food during the early days of life, and in the interior of the country this consists mainly of insects in the larval or mature stages, spiders,



Fig. 92. Female Kingbird astride nest with drooping half-spread wings, shielding her brood from the hot sun. Notice the characteristic attitude of the young.



Fig. 93. Kingbirds bruising a too active grasshopper between their bills preparatory to serving it to the young : the female in front with tail full-spread.

earthworms (at least in the Robin) and possibly slugs. Aside from the habits of the adult the nature of the food brought depends much upon the character of the supply. When the Kingfisher finds crayfish abundant they are carried to the nest, and this species has also been known to go to the fields for insects. Along the coast various other invertebrates undoubtedly contribute to the food supply of both young and adult birds of many species. Birds which never taste of fruit themselves naturally do not give it to their young, while Robins, Orioles, Vireos, and Waxwings, to mention but a few of the berry-pickers, vary the diet of their fledglings with a liberal supply of fruits of various kinds.



Fig. 94. Female Kingbird assisting a grampus down the throat of a nestling. The long gray wings of this insect are still protruding from the mouth.



Fig. 95. Male grampus, *Corydalus cornutus*: full size, from life.

The food is placed not simply in the mouth of the young but well down into the sensitive throat, and if the bird does not immediately respond, it is withdrawn and passed to another, and often to a third, until a throat is found which has the proper reaction time. If the gullet is already full, the swallowing power is inhibited, and the bird must wait. If the experiment of feeding a young bird like a Robin at the nest is tried, it will be found that the food passes slowly down the œsophagus, and when this is filled no more can be taken until the channel is clear. The gullet thus acts as a brake to the tendency of the greedy young bird to gorge itself to suffocation. According to Audu-



Fig. 96. Female Chestnut-sided Warbler bristling to keep cool while brooding on a hot June day.



Fig. 97. The same bird in the more common brooding attitude.

bon, Cedar-birds will sometimes gorge themselves to such excess with berries as to be unable to fly, and a number of wounded birds of this species which he kept in a cage ate of apples until suffocated. When opened they were found to be filled to the mouth.

The automatic response given by the young is the signal awaited by the old bird, though often with impatience. The insect is watched after being placed in a responsive throat, until it disappears. Should it stick at the gullet it is withdrawn and replaced time and again, or given a gentle pull, until it is safely down. Sometimes the insect is bruised against a twig, beaten into a pulp or crushed and torn asunder between the bills of the parent birds before it can be safely delivered. As has already been seen, many birds utter a peculiar note as a special stimulus to the young. At such times even the silent Cedar-bird finds a voice and gives an impatient *cheet!* If this call passes unheeded it often becomes extremely shrill, especially in Kingbirds, with whom failure on part of their young to quick response seems to be peculiarly exasperating.

While watching a Kingbird's nest from the tent, a moth miller was once brought in by the male. It was passed to each one of the young in turn, but even under the spur of his shrill chitter, they were unresponsive, and he devoured the prey himself. This sharp economy is often practiced at the nest, and I have even seen the leg of a grasshopper picked up and eaten by an old bird. Not a crumb is allowed to go to waste. If an insect gets away it is usually pursued and immediately snapped up. Once, however, I saw a female Kingbird fooled by a fly who owed its life to its small size. As she opened her bill in her attempt to land it safely in an open throat, the fly darted off. The

bird seemed dazed for a moment, and stood gazing at the departing fly as if in mute astonishment.

Exciting scenes usually follow at the nest of the Kingbird when a large dragon-fly, cicada, or grampus is brought to the family circle. The insect often struggles hard, but escape is out of the question, especially with both birds at the nest, who at once begin to rend and crush it with their bills.

The male grampus (*Corydalus cornutus*) better known as the larval hellgamite of which black bass are sometimes extremely fond, has long gray wings folded back over the body when at rest, and the head is armed with horns an inch long but formidable only in their appearance. I have seen these huge insects measuring four inches from tip of the jaws to the extremities of the folded wings fed to a single bird, and they were swallowed—wings and all. The operation is shown at an incomplete stage in one of the illustrations, where the wings of the grampus can be seen projecting an inch or more from the mouth of the struggling bird.

The cicada is even tougher and harder to manage but is beaten into subjection, and served up in a limp condition. Last August, I witnessed a street combat between one of these cicadæ and an House Sparrow. The insect was bounding up and down on the ground and sounding its crescendo at an alarming rate, but unable to avoid the blows which rained from the Sparrow's bill. As the music of the dying cicada finally ceased, the Sparrow picked up his victim and bore it off to his brood



Fig. 98. A common scene at this nest. The male brings food, while his mate, who is brooding, receives it into her own bill and passes it on to the children.



Fig 99. The same brooding bird, with feathers erect and throat inflated.

II.

CLEANING THE NEST.

The sanitary condition of the young is a matter of great concern to most birds,

who as a class are extremely neat and clean. This is especially true of many species who breed in holes or cavities of any kind like the Woodpeckers and Chickadees, the young of which are crowded in close quarters or even piled up in more than one layer. The Woodpecker's hole and the Bluebird's nest are always sweet and clean, and the nestlings immaculate.

The duty of inspection and, if necessary, nest-cleaning follows each feeding with clock-like regularity, and is one of the most characteristic and important activities to be observed in the nesting habits of a large number of the smaller land birds, yet apparently it is not mentioned in the standard treatises of ornithology, and I have found but few references to it in works of any kind. Audubon, who has probably recorded more facts on the behavior of American birds than any other writer, does not, I believe, mention this important function. The reason is not far to seek, for without the possibility of close approach to the nest, and the use of a convenient blind, such acts are difficult or impossible to observe.



Fig. 100. Brown Thrush feeding a nestling. "The food is placed not simply in the mouth of the young, but well down into the sensitive throat."

The instinct of inspecting and cleaning the nest is mainly confined to the great passerine and picarian orders represented in this country by hundreds of species. It is a well-marked trait in Thrushes, Waxwings, Vireos, Warblers, Orioles, Blackbirds, and Woodpeckers, to mention those families in which it has been observed.

The excreta of the young leave the cloaca in the form of white, opaque or transparent, mucous sacs. The sac is probably secreted at the lower end of the alimentary canal, and is sufficiently consistent to admit of being picked up without soiling bill or fingers. The parent birds often leave the nest hurriedly bearing one of these small white packages in bill, an action full of significance to every member of the family. I have seen the Oriole carry these packages a few rods from the nest and drop them before alighting. The Bluebird and Redwing Blackbird take them a long distance before letting them fall.

Some Crow Blackbirds which I watched last spring had their young in the top of a fir tree beside a small pond, which lay between me and their nest. In approaching with

food they would stealthily enter the tree on the farther side and after a few moments fly over the pond and drop what looked like a small white marble in the water below. This effected, they would veer and fly off to the feeding ground. The same action was repeated by birds from other nests.

Removing the excreta piecemeal and dropping it at a safe distance, is the common instinctive method not only of insuring the sanitary condition of the nest itself, but what is even more important, of keeping the grass and leaves below free from any sign which might betray them to an enemy.



Fig. 101. Brown Thrush cleaning the nest.

Many other birds, of which I can now certify the Robin, Catbird, Cedar Waxwing, Red-eyed Vireo, Kingbird, Redwing Blackbird, Brown Thrush, and Chestnut-sided Warbler, devour a part and often the major part of the excreta at the nest. This is a very common practice with the Warbler, Robin, Waxwing, and Vireo, but was only casually observed in Catbirds and Brown Thrushes.

The Robin has undoubtedly been seen by many in the characteristic pose shown in a number of the photographs standing on the rim of the nest with the head erect, or inclined as if doting on her young ones and thinking what fine children they were, whereas this attitude is really one of sanitary inspection. When an old bird of any of the species mentioned above has fed one of the brood, its duty is but half done; it pauses, bends over, and keenly scrutinizes each young bird in turn and every part of the nest. Shortly after being fed, the nestling becomes very uneasy, and raises its body as if to drop the sac over the edge of the nest. The old bird follows every movement, snaps up the package as it leaves the body, and either swallows it immediately or carries it off. When seen flying from the nest with head depressed, the Robin is usually engaged in errands of this kind. The Robins and Cedar-birds have frequently been seen to take the sacs from two or three birds in rapid succession, in which case they are always devoured on the spot. The Robin will often convey the package to any convenient perch, and after examining it, devour a part, or reject the whole. While watching Robins from the tent I have seen them carry the excreta thirty rods away before letting it

fall or alighting to examine it, and have tried to find the sac but usually without success. One day I saw a male Robin drop the "white marble" in the grass about fifty feet from the nest, and proceed to peck at it. Upon going to the spot a little later I found the sac covered with dirt but not opened. It had a tenacious opaque white wall, was perfectly odorless, and contained besides a few small pellets, a whole blueberry which had survived the digestive process. The actions of the old bird were thus explained. He was looking for food on his own account, but in this case missed it.

On another occasion the mother Robin devoured all the excreta which soiled the nest, and a moment later took it directly from the young and carried it away. Again on a later day, the same bird after swallowing all the excreta available, dropped on the nest and brooded her young twenty minutes by the watch, without showing the least desire to reject anything which had been eaten.



Fig. 102. Cedar-bird cleaning the nest. Compare this common attitude with that shown in Figs. 45 and 46.

The female Cedar-bird in her usual round of domestic duties comes to her nest of half-fledged young, regurgitates cherries, and after distributing them in the usual fashion, inspects her household with the closest attention, picking up and swallowing every particle which it is necessary to remove. This accomplished the mother bird has been seen to spread her wings over her brood, and shield them from a hot August sun for over an hour. Meantime her mate came repeatedly, and passed the cherries around. The female who stood erect astride the nest, would frequently inspect and clean the household. She would also snap at every passing insect, and I saw her catch a large red ant, and quickly transfer it to the mouth of a young bird. She would erect and lower her crest and stand with mouth agape for long intervals, but there was never a sign of ejecting anything which had been eaten.

At still another nest of the Waxwing I saw the female after feeding cherries, inspect, and walking around the rim of the nest, take the sacs from four young birds in succession, direct from the body, and after swallowing them all, look for more. She then flew to a neighboring tree and cleaned her bill. In performing the sanitary act this bird bends over, and reaching forward with head turned slightly to one side, takes the sac rather gingerly as it leaves the cloaca, and quickly disposes of it. In the course of forty-four visits to their young of which exact record was made, this nest was cleaned eighteen

times ; once a part of the excreta was taken away and a part eaten ; five times it was removed from the nest, and on eleven visits all was devoured.

After watching such behavior, which I have seen repeated with slight variations hundreds of times, I am convinced that the excreta in such cases is actually eaten, and not merely taken into the gullet to be later regurgitated. It is true that the Cedar-bird uses its distensible gullet as a temporary receptacle for the food destined for the young, and it might seem probable that the excreta went no farther than the œsophagus, from which it was later ejected. The actions of the birds just described and in many similar cases observed do not support this idea.



Fig. 103. Female Kingbird attending sanitation of nest.

Not only are the young carefully tended in the way explained, but the old birds often put the head down in the nest and rummage about for any stray particle of food or fragments of any kind which it is desirable to remove. While standing at the nest they will sometimes pick energetically their own legs and toes, and the heads and bodies of the young, a very important function where the nest is infested with those minute swarming particles known as lice and mites. Every straw and fiber in the Cedar-bird's nest shown in one of the photographs (Fig. 38) was literally covered with parasites, in this case a species of mite which is a poor and degenerate relation of the spider. When the nest or anything in it was touched they would swarm up the hand by hundreds, but they are barely visible to the eye, and apart from a slight tickling sensation between the fingers are scarcely felt. They do not seem to trouble the old birds much, but must give discomfort to the young, especially if from any other cause they happen to be weakly.

One would suppose that cleanliness must be an imperative instinct with such a bird as the Kingfisher, whose nest is underground, but the semi-fluid excreta is not removed from the tunnel, which according to some observers, becomes fouled in consequence. This was not true of the nest which I had under observation last summer. In the course of seventeen days the nesting chamber was moved forward more than a foot, so that it always presented a clean surface.

The Barn Swallow, the House Sparrow, and the wild Passenger Pigeon represent a considerable number of birds which secure protection in their breeding haunts by other means than by concealing the nest. While their nests may be clean, this is not true of the ground beneath. It is plainly advantageous for the smaller birds which breed in

solitude on or near the ground to remove every particle of litter which would whiten the grass or foliage and thus advertise the nest to their enemies, even to those who prowl at night.

When a Red-eyed Vireo whose actions I was watching at close range dropped one of the sacs by accident, she would dart after it and snap it up before it reached the ground not four feet from the nest. I have also witnessed the same performance in the Kingbirds. Not a trace of defilement is ever seen about the dwellings of any bird possessed of the cleaning instinct.



Fig. 104. Baltimore Oriole hurriedly feeding her young before all fear has been subdued and behavior is free.

On the other hand predaceous birds like Eagles and Hawks pay no attention to such matters. The excreta of the young as of the adult is voided in a semi-fluid state and in a peculiar manner. With tail upturned over the edge of the nest it is shot to a distance of several feet, and may strike the ground two or more yards from the nesting tree. In this way the eyry at least is kept clean. These bold and persistent robbers have few enemies to reckon with, and their nests may be as open to view as a castle on a hill.

Owls, which breed in holes in trees, are reported to have filthy nests, especially when the cavity has been occupied for several successive years, but this seems to be due mainly to the remains of their quarry or to the accumulation of the rejected food-pellets. The haunts of certain sea fowl are often reeking with filth during the breeding season, and the guano-beds of the South American coast mark the breeding grounds of myriads of sea fowl. However, the birds themselves both old and young seem to manage to keep clean, and any other condition would soon become intolerable.

The Turkey Buzzard seems to have touched the lowest depths of squalor to which any bird can descend and live. In speaking of their abodes, Audubon says that before the final departure of the young, a person, if forced to remain in their vicinity for half an hour, would be in danger of suffocation.[1]

The cleaning of the young and nest is instinctive in a very large number of birds,

[1] *Ornithological Biography*, vol. ii., p. 43.

and so is also the care with which they avoid any defilement of the nesting site. The use of the excreta as food, however, is to be regarded in a different light. If it should be proved that in the Robin, for instance, some individuals never eat the excreta, while others as we know do, we should regard the action as an acquired habit. When the pellicle breaks in the mouth, an accident which I have seen happen in the case of the Robin, the bird is obliged to swallow a part in order to get rid of it.

Much light is thrown on this question by the behavior of the Chestnut-sided Warblers, whose habits will be referred to again in the concluding chapter. Both sexes in this case fed, brooded, and cleaned the young and nest. The male regularly removed the excreta but was never seen to eat it. The female on the contrary often ate of it, and brooded so constantly that she was obliged to leave the nest to satisfy her own hunger. She would often be back in half a minute, having taken only a bite as it were. When the female had received the food which her mate supplied and had seen it safely delivered, she would inspect, devour everything which needed removal, and then continue to brood. If a sac should accidentally fall, she would snap it off the ground, return to the nest, and brood as before. At other times when the male approached she would stand aside and allow him to deliver the food and make the inspection. Twice I saw the male take a sac to carry it away, and the female snatch it from him, swallow it, and settle down on the nest. Again another sac was torn asunder, and each bird went off with a half in its bill. In a moment the female returned but without bringing food, showing that she had been satisfying her own hunger. This not only proves that the excreta is used as food but illustrates how the habit of eating it may be forced upon a hungry brooding bird.



Fig. 105. Serving a black cricket to a fledgling who has climbed to the rim of the nest and is struggling to maintain his position.

Since digestion in the young is an imperfect process at best, it is easy to understand how any kind of pre-digested or partly digested food might be acceptable in times of stress when the staple article was not easy to procure. The fact that a bird only casually devours a pellet or swallows one and removes another is easy to understand. It is a ques-

tion of the hunger of the moment, and another illustration of the economy which birds display in all such matters.

While the removal of the excreta is an instinctive act, the use of it as food is probably an acquired habit, the strength of which depends on the force of circumstances, and may be limited in some cases to one sex alone.



CHAPTER XII.

THE FORCE OF HABIT.

UNDER some conditions habits are formed with surprising quickness. The habit may be of trifling significance and have only a brief reign, but no habits are absolutely rigid, and the genesis of all is probably the same,—pleasurable consequences following repeated actions which may be forced or accidental. The result is in all cases similar,—a mental association of certain things with certain actions.

While watching hour by hour the Robins described in Chapter IV, and recording their visits to their young, I began to notice on the third day that the male usually approached on the right side of the nest, that is on the observer's right as he stood facing it, while the female frequently came to the back or on the left. From that time I recorded the manner of each approach, and found that the male invariably came to the right side, and hopped down the limb to his nest.

In the table given below in which the visits of both birds are recorded for two consecutive days, R is for the right, L for the left, and B for the far side of the nest with reference to the tent, while the dashes represent visits the character of which was undetermined. Each sign represents a visit to the nest, at which food was usually served.

July 27th. Third day of Observation—6½ hours.	*Female*	R R — R R L B R R R R R B R L — — L R — — — — — L — — R
	Male	R B R R R R R R R R — R R B — R R R — — R R —
July 28th. Fourth day of Observation—4 hours.	*Female*	L B B L B — B — — — B B — —
	Male	R R R R R R R R R R R R — R R R

For the fourth day I have no record of the female approaching by the right side, and no record of the male coming in any other way. On the two following days the female did not appear, and as I had reason to believe, was engaged in building a new nest. The male at this period always approached his nest in the habitual manner. Now whether the male bird had formed this habit shortly after the nest was built or shortly after the nesting bough was removed is of little consequence. At all events a definite mode of behavior had developed in a short space of time, in one case in two weeks or in the other in two days. On the fourth day the young had to be brooded often, owing to the heat, which accounts for the apparent inactivity of the female in providing food.

Probably most birds form definite habits in the manner of approach to the nest, entering on a certain side, or flying to a certain twig, following the path suggested in the first instance by convenience or dictated by caution. A pair of Red-eyed Vireos with whom I spent parts of three days followed a definite course in approach with surprising





Figs. 106, 107. Male Redwing Blackbird cleaning nest on two distinct visits; photographed under similar conditions, and illustrating the formation of habit in the daily routine.

regularity. They would fly to the main branch, hop along toward the fork in which the nest was suspended, and finally perch on a small convenient twig just over their young. Out of sixty recorded visits they deviated from this habitual method but three times, and then only before they had recovered from their first feelings of fear. In this case the nesting branch had been drawn down about a foot by means of a cord, but was not otherwise disturbed.

In cleaning the nest the attitude is frequently the same in successive visits, the birds often clasping the same twigs, so that a number of photographs of the act taken without moving the camera may be so nearly identical that only the most careful inspection will reveal the least difference in pose or position.

While engaged in studying some Redwing Blackbirds last July the weather was hot, and the young had to be brooded almost constantly. The female would sit on the nest, often with back to the tent, with feathers erect and mouth open in her efforts to keep cool. Suddenly the shriek of a steam whistle sounded the hour of noon at a mill scarcely three rods away. It startled me, but the bird did not budge a feather. It is not difficult to imagine that her first experience with this instrument of torture was quite different in its result, but the case illustrates the ease with which birds become quickly accustomed to strange and uncouth sounds, when, as sometimes happens, they place their nests in a saw-mill a few feet from the buzzing saw or above the grinding trolley cars of a city street.

Every animal must adapt itself in some measure to changes in its surroundings, and with birds this power is well expressed in the nest, the position, materials, and construction of which are subject to incessant change. The change may be slight or of a very marked character, as when the common type of architecture is abandoned, or a distinct nest-structure wanting. Only a few examples of change in nesting habits need be considered since the facts are matters of common observation.

The Swift of this country is often quoted as one of the most remarkable examples of birds whose nesting habits have changed in recent times. Formerly breeding in hollow trees and still doing so in places remote from mankind, it now attaches its little wicker crates to the inside of chimneys. From the standpoint of the Swift the change has really been very slight, and had it not become so widespread it would have attracted little attention. This bird was probably drawn to the town and open country by the greater abundance of its insect prey, and to the mind of the Swift a chimney cannot be very different from a hollow tree. Its instinct probably does not lead it to select a dead tree for its roosts or nests because it is a tree, any more than it leads it to prefer a sycamore to an oak. What is probably inherited is the tendency to seek a dark or cavernous place with easy entrance and exit. The chimney which emits no smoke in summer and usually stands in the open, fulfils every requirement in places where hollow trees are scarce.

The Swift is yet capable of



Fig. 108. Cock Robin with large grasshopper ready.
Fig. 109. The same bird taking aim.



Fig. 110. Ready to inspect. Notice that he invariably comes to the right side by force of habit.



Fig. 111. Inspecting the household. The female approaches on the left.

adapting its needs to conditions far more unlike those of the ancestral tree, and has been known to enter a barn and nest with the Barn Swallows. This happened in Dorset, Ohio,[1] where some Swifts fastened their nest to the vertical boards near a hole made for the convenience of the Swallows, and just below the peak of the roof. Five young were hatched and were seen clinging to the boards just beneath the nest. The old birds would sometimes enter by the open door, fly straight to the nest and cling to the wall beside it. The quavering voices of the little Swifts would then drown every other sound about the place.

In still another case,[2] a pair of Swifts nested in the dim interior of a shed beside an old saw-mill at Dorchester, New Hampshire, in June, 1899. This nest was fastened to the boards, well up towards the roof, and an open door formed easy entrance and egress.

In at least one respect birds resemble men in their ordinary building operations. They make use of the materials at hand, but in the selection of the site for the nest many seem to obey no rule, being ever on the alert to adapt themselves to their lot, and a habit once formed often leads to a steady line of conduct.

The English Sparrow has even found a convenient shelf in the hood of the electric arc lamps, and although these are lowered daily to the street, it sticks to its nest over the light. I have seen this impudent little wretch dispossess the Eaves

[1] This account was given to me by Mr. Robert J. Sim.

[2] Observed by Professor William Patten.

Swallow and convert its mud retort into a grass-lined nest of its own. This occurred at Basin Harbor, Vermont, in 1883, before the Sparrows were so generally condemned. The nests were in line under the eaves of a farmer's barn, and the Swallows were still fighting for possession. About every other nest was then occupied by the Sparrows.

The Osprey is not only one of the most remarkable nest-builders in the world, but a wonderful adept in making the most of its opportunities. In selecting a site for its mountain of a nest, it seems at times to exercise little choice, taking whatever offers. Apparently its controlling ambition is to raise a huge edifice in the construction of which nothing comes amiss which can be seized and carried in its powerful talons. In its building operations this bird seems to have an eye for the centuries rather than the years, and some of its eyries formed on rocky crags have possibly existed for more than a hundred years, or might last so long if undisturbed by man. This Hawk will nest on the ground, on rocks, in low or high trees, in woods or in the open, on a chimney, a pile of rails, a rocking buoy, or a dilapidated windmill. It will even suffer its nest to be displaced, and at Bristol, Rhode Island, it eagerly appropriates the cart wheel which the hospitable farmers raise aloft on the tops of poles for the benefit of these birds.



Fig. 112. Female Kingbird inserting an insect into the throat of a fledgling.

At Plum Island, New York, which was formerly colonized by hundreds of Ospreys, Mr. Allen found their nests in almost every conceivable situation, about thirty or forty per cent. of them being on the ground. "High rocks on the shore, and low rocks far out in the water, scarcely above high tide and swept by the autumn storms, were chosen as situations for the nests. A large buoy, with a lattice work top, near the west end of Fisher's Island, was also occupied for many years by a nest of these birds, greatly to the advantage of sailors and fishermen, who were warned in thick weather of the position of the buoy by the screaming of the Fish Hawks."[1]

An observer who described a nest on an old windmill said that while the fan of the mill was gone "the rudder remained, and the wind catching this would swing the nest part way round, and then the wind changing slightly would swing it back again; the sitting female not seeming to mind the movement in the least."[2]

On the shore of Narragansett Bay, Rhode Island, which has been colonized by Fish

[1] "Breeding Habits of the Fish Hawk on Plum Island New York." C. S. Allen, *The Auk*, vol. ix., p. 315. 1892.

[2] *The Osprey*, vol. ii., p. 55. Many interesting pictures of nests of the Osprey have been published in this magazine.

Hawks from an early period, the birds are not only protected by law, but are offered every inducement to make them feel at home.[1] When a dead tree containing a nest is blown down the owner of the land will sometimes erect a tall pole, with a carriage wheel laid flat on top. The birds readily accept the new wheel of fortune, which becomes their home.

In selecting a bare tree or a wheel on top of a pole the hawk makes a nice choice, for owing to its great extent of wing, as with the eagle, it is convenient to have the path to the nest free from obstructions.

When an Osprey loses its mate its actions seem to depend on its character. A case is reported where two birds were seen to pair on the second day after each had lost a mate, while another who was bereft by a stroke of lightning, which destroyed both the nest and the sitting bird, is said to have lingered about the spot for the remainder of the summer, and to have even returned the next year still unmated to his solitary vigil.[2]

The diet of an insectivorous bird is extremely varied at all times, depending much upon the locality and the season of the year. While a few kinds of insects may be avoided because of a repugnant odor or taste, they capture as a rule whatever comes in their way. The Robin commonly brings to its nest grasshoppers, crickets, katydids, and angleworms, because in its customary manner of search it finds and is able to secure these forms in abundance. The Kingbird, which takes most of its prey on the wing, discovers a far greater variety. When certain species of insects are abundant they are often eaten by many birds who under ordinary conditions would never touch them. Thus during a plague of Rocky Mountain locusts which visited the Western States, these insects are reported to have been eaten by nearly every bird in the region, and to have served as a staple for most of the species. Birds of prey such as the smaller hawks and owls devoured them eagerly. The food habits of most birds are exceedingly plastic and liable to sudden change under the spur of necessity.

A good illustration of a change in feeding habits has been recently given.[3] It appears that the Rhinoceros-bird (*Buphaga erythræpyncha*) was until lately regarded as so valuable a scavenger that it was accorded special protection by law in British East Africa. Its habit was to feed on the ticks and other parasites which infest wild and domestic animals. "Since the cattle plague," says Captain Hinde, "destroyed the immense herds in Ukambani, and nearly all the sheep and goats were eaten during the late famine, the birds, deprived of their food, have become carnivorous, and now any domestic animal not constantly watched is killed by them. Perfectly healthy animals have their ears eaten down to the bone, holes torn in their backs and in the femoral regions." The new conditions introduced by man have thus converted a useful animal into a dangerous pest.

[1] For an interesting account of the nesting habits of the Osprey see *Forest and Stream*, July 7, 1900.

[2] *The Osprey*, vol. ii,, p. 50.

[3] *Nature*, vol. lxii., p. 366, 1900.

CHAPTER XIII.

FEAR IN BIRDS.

BIRDS as a rule are possessed of fear which is primarily an instinct, but as we shall see later on many species in their natural adult state are entirely devoid of this sense. With others it may wax or wane according to their environment or individual experiences. Again the nature of the fear manifested varies with age or the period of life. It is a generalized sense of fear, or fear of the strange and unusual, which comes over the young bird, while later it learns to dread particular objects or sounds with which some bitter experience is associated. Furthermore, the time of the appearance of the instinct varies in different species, coming late in some and early in others. Generally speaking the manifestation of fear is well timed, and is an adaptation for the good of its possessor.

Let us first see how fear enters into the life of the young. Birds are sometimes roughly classified into altricial species, which feed their young for days or weeks at the nest, and præcocial birds, whose young are born clad in soft down, and are able to walk, run, or swim at once or very soon after hatching. The Altrices like the Robin, Woodpecker, and Humming-bird are hatched from eggs which are small in relation to the size of the parent, and the young are at first blind, helpless, and more or less completely naked. In all such the nest is only a temporary home, but is often very elaborate, while the instinct of fear is delayed or deferred until the time of flight, a period varying from a few days to three weeks or more. The Præcoces lay eggs with big yolks, upon the stored energy of which the unhatched young subsist until they step forth into the world, seeing, able to walk or swim, and in some degree their own masters. The common domestic fowls, Partridges, Ostriches, Geese, Loons, Plover, and Snipe, are some of the better known representatives of this group, but the dividing line is never sharply drawn, and there are innumerable gradations between the extremes in either class. In the præcocial birds the feeling of fear is either present at birth, or appears in a very few hours or days,

As an illustration of the development of fear in the altricial kinds one might select any of the common passerine birds, Thrushes, Warblers, Finches, or Flycatchers, but we should bear in mind that the development of this instinct is not always uniformly timed, even in the same species. We will choose the Catbird, the Chestnut-sided Warbler, and the Kingfisher.

When I first camped beside a Catbird's nest (No. 6 of table, Chap. I.) last summer, the young, who were then about a week old, were incapable of fear. They would shift about the nest to get into the shade, pant, and erect their growing head-feathers. When a breeze rocked the cradle, or a Redwing Blackbird sang his *conquer-ee*, or the parent



Fig. 113. Eggs and young of altricial Cedar-bird. Young about thirty-six hours old—blind and naked.



Fig. 114. Bird on left shows instinctive response to sound or vibratory movement, and the use of wings for support.



Fig. 115. Bird to the left in reptilian crouching attitude; at the right, as in Fig. 113, the characteristic response of the new-born bird is seen, and the use of the pot-belly as a foot. About ⅔ life-size.

came with meat or fruit they stretched necks, opened mouths, each struggling to get some advantage over the other, and uttered their sharp *tsit! tsit!* notes. You could handle them at will; they were absolutely fearless. If such a nest is overturned they will cling to it but will never cower or crouch.

As we have seen, the clipping of a leaf at this nest two days later sent them off in a panic, and all hurried to the nearest cover. Should you succeed in catching them under such circumstances, which is doubtful, and try to replace them in the nest, they will pop out repeatedly as if mounted on springs, and if you try to hold them in the hand they will struggle, squeal and fairly shriek in their endeavors to escape. They are now covered with a coat of slate-colored feathers, but fly with difficulty. When placed on open ground they hop off at once toward the nearest bush. No greater change in the behavior of a wild bird is ever witnessed than that which the sense of fear brings to pass.

I have seen a young Chestnut-sided Warbler jump out of its nest, when unable to stand erect and much less to use its wings. In this case the pin-feathers of the wings had barely burst, and the body was nearly naked. When the bird was returned to its nest, it refused to remain until the operation was many times repeated and it was finally overcome by fatigue. I have known the young of the Redstart to leave the nest remarkably early, but the case just recorded appears to be somewhat exceptional.

The instinct of fear comes with

a certain maturity of the nervous system, with comparative suddenness, as we have just seen, but is usually timed to correspond with the development of the wing-quills and the power of flight.

At the age of twenty-four days the Kingfisher is in full feather, but shows no fear. He will perch comfortably on your hand or shoulder, and pose in any desired position, as the photographs made at this period will show, but the instinct soon appears after this stage is passed. In from twenty-four to forty-eight hours later when these birds not only possess the power of flight, but use it at the first intimation of danger, their docile nature has completely changed. With them the late development of this instinct is most oppor-



Fig. 116. Young Kingfishers twenty-four days old. They are capable of flight, but show no fear.

tune, since they are not tempted to leave the security of their tunnel in the ground until they can make long excursions and follow their parents to the favorite fishing grounds.

Turning now to the præcocial birds, according to the best testimony, fear in the domestic chick hatched in an incubator is at first very slight and is soon checked by contrary impulses such as to nestle in a warm place, unless the instinct be brought into immediate exercise.

Mr. Charles A. Allen says that the newly hatched young of the Black Duck (*Anas obscura*) show no fear, but will "cuddle under one's hand very confidingly." I once saw a nest of this species on the shore of Lake Champlain, near Burlington, Vermont, on the very verge of a high, overhanging cliff. It was set against the stems of a slender shrub, the pulling of which would doubtless have precipitated the entire clutch fifty feet into

the water below. A little delay in the instinctive reaction of fear could hardly come amiss to young in such a nest. On the other hand when the ducklings have been led to the water no birds show a keener sense of fear than they or respond more promptly to the alarm signals of their parents. I was greatly impressed when a boy at the sight of a Black Duck leading her trim little fleet of yellow sail up the mouth of a small sedge-bordered stream. The old bird quickly gave the alarm, rose, veered, and flew towards the river, while the young scrambled to the bank and hid in the rushes. I hunted long but succeeded in finding only one who lay flat in the marsh and kept perfectly still, true to its inherited instinct. These ducklings had not been afloat many hours, and had this action been repeated before, the lesson could not have been taught, since, as we have seen, the young under such circumstances are left to their own devices.



Fig. 117. Young Cedar-birds in displaced nest standing in characteristic attitude with upturned heads. Photographed on day of flight, July 17, 1899, when possessed of fear. For account, see page 60.

I have seen a young chick while feeding quietly close to the house suddenly turn its head, look straight at the zenith, and then run off in a panic of fear. Looking up also I saw a Hen Hawk sailing aloft like a toy kite, a mere speck against the blue heavens. I think it probable that the bird got an alarm signal from some other fowls in the yard; at all events it knew where to look, and its response was not slow. This chicken may have been three weeks old, and so had ample time to learn its lesson, if such it was. Had the dark object been a paper kite it is not likely that the fear evoked would have been appreciably less.

In altricial birds the sense of fear usually comes, as we have seen, with the development of the flight feathers, but it is often premature, thus indirectly causing the death of thousands of birds every year. In July and August how many helpless sparrows and thrushes are found on the ground, having left their nests too early! Sometimes they tumble out by accident, are drawn off by hunger, or are blown out in a gale,

but I believe that by far the greater number of such strays are driven forth by fright, and when this perilous step has once been taken it can seldom be retraced. The young of such birds as the Wilson thrushes, whose nests are on or near the ground out of the reach of storms, are often found in this predicament.[1]

Many immature birds which I have watched at the nest show no precise powers of discrimination in any direction. You will see them respond as promptly to the flutter of a leaf or the call-note of any passing bird as to their own mother's voice but a more curious spectacle may be witnessed when a fledgling of one of our common species like, the Baltimore Oriole climbs to the top of its nest. All the others immediately salute it as if it were an old bird, and with open mouths beg vainly to be fed. If a young bird within a day of taking flight cannot distinguish one of its brothers from its mother, it can hardly be expected to "know a hawk from a handsaw," or an enemy from a friend.



Fig. 118. Brown Thrush startled while at nest: attitude of keen attention.

After taking flight the young of altricial birds are fed by one or both parents for a period of days or weeks, and much is quickly learned by imitation and individual experience. Their ingrained sense of fear becomes in the course of time gradually specialized in certain directions. Fear of man, guns, hawks, snakes, cats and the various agents of destruction with which each species must contend in the course of its life, seems in every case to be acquired or learned rather than inherited.

On the last day of June I found a Cowbird nearly full-fledged but either unable or disinclined to fly. He occupied the nest of a warbler, apparently the species known as

[1] The huge pot-belly of the young altricial bird has a use quite apart from the function of digestion. It anchors it to the nest, and as in the modern "Brownie" keeps it right side up. The pliant viscera conform to every movement, and form a central supporting pillar long before the legs can sustain the weight of the body. (See young Cedar-birds in Figs. 113–115.)

the Black and Yellow or Magnolia Warbler, and as his photograph shows, filled it completely. He would stand on the rim of the nest and, with raised feathers, squeak and call vehemently for his foster parents. I took from beneath him the dried mummy of a little warbler and one addled egg, which illustrates the advantage nature gives this bird over his competitors in early life. He showed no fear, but clung like a monkey to the nest, while I carried the branch several hundred feet to find a quiet place out of the wind. I regret that I cannot show the nurse feeding this monster, but unfortunately the day was stormy and the bird was soon gone.

Many birds have alarm calls or signals of distress, which attract or arouse other species, as every one knows who has studied birds in the country. I remember seeing an unusually striking exhibition of this fact while watching unobserved some Red Crossbills engaged in picking the seeds out of pine cones. They were on the ground in a run where it was impossible for the birds to see out on either side. A Crow espied me at a distance, gave his short quick alarm *car ! car !* when the Crossbills went off as if carried in a whirlwind. They had apparently seen nothing to awaken suspicion, and the crow is not their enemy so far as I am aware.



Fig. 119. Cock Robin startled while at nest by a quick, decisive alarm call from his mate. His head shot up like a flash, and in a moment he was off.

When a robin hears the alarm call of his mate, his head goes up instantly, and he stands for a moment with outstretched neck, listening intently to see if he is needed. I was fortunate in catching the male bird at the nest in just this attitude, expressive of attention and wariness, bordering on fear.

A hawk, owl, crow, cat, snake, or any well-known or dreaded enemy of birds will set the community in a hubbub in a very short time. Birds of other species hurry to the scene out of sympathy or curiosity, as some would say, but probably more from instinct of a different character. The smallest spark often kindles the largest blaze. Thus while passing through a pasture last June I happened to encounter a Robin with mouth stuffed with food, as if on the way to her nest. She at once set up a loud cry, and mounting the bare branch of a dead apple tree, in five minutes drummed up eleven different birds, among which I recognized the Baltimore Oriole, Brown Thrush, two Catbirds, Chestnut-sided Warbler, Red-eyed

Vireo, Maryland Yellow Throat, Song Sparrow, Chickadee, the Redstart and a Goldfinch, many of which became excited and joined in the general outcry.

On a warm July day while crossing a barren strip of land, which bore a crop of golden-rod and sweet-fern, my attention was called to a small brown bird with a large grasshopper in its beak. It was the Bay-winged Bunting or Grass Finch, and the prey was clearly intended for her young, but instead of delivering it she hopped nervously about, uttering her sharpest monosyllables, in the course of which she finally dropped the prey. Thinking that her young were at hand, I sat down to await developments. Presently several Buntings dashed up to the spot a few yards away. They glanced down at the ground, and then at me, emitting such a flow of incisive protests as to suggest the attempt to draw attention from their nest. This was plainly not the case when some Kingbirds left their young in a neighboring tree, and raising their war-cry, hovered over the spot and darted at some object on the ground. Thereupon going to the place, I almost stepped on what looked at first like a coil of rubber hose in the grass. It proved to be a large black snake, whose head was distorted in the act of swallowing a young bird. The crisis for the unfortunate bird being past, I stood by and watched the proceedings. The snake had taken his victim head first, and its body was slowly disappearing between his distended jaws. As I disturbed his meal, he folded his dull, rubber-like body into a coil and his gleaming eyes betrayed an unpleasant frame of mind. When I approached nearer, he lifted his swollen head high in the air, and slowly glided off to enjoy his spoils in peace; but his enemy followed. On this occasion we had the serpent at a disadvantage, but he did not remain muzzled long Having proceeded thus far, that bird had to go down, notwithstanding the throes of deglutition. It was a tax upon the salivary glands, but they were equal to the task, and the pliant jaws soon closed over their victim. What a picture of stealth this animal made as with head erect, and eyes darting angry glances, he stole through the grass! The first act of the tragedy being closed, it was time to add the final touches of the second. As I struck at him with my cane how he shot through the grass, and it required no little speed to reach him for the fatal blow!



Fig. 120. Red-tailed Hawk, four months old, in attitude expressive of his own fear, and well calculated to inspire fear in others. The young bird at the nest will spread its wings as well as erect its Elizabethan frill, and hiss at intruders.

We have seen that the instinct of fear is inherited, and often delayed, where it is a special adaptation, not only leading the young, as Lloyd Morgan remarks, to accept a foster parent and not to shrink from her, but what is more important, keeping the young in the nest, barring accidents, until they can in some degree help themselves. Fear of particular objects is learned, or becomes grafted on to the original stock. The instinct may gather force or disappear, at least in adult life, according to the nature of the environment and the new habits formed in consequence. The instinctive basis of fear is apparently handed down from generation to generation, but in the life of the full-grown bird, it is probably largely replaced by habit, or the formation of associations. The innate or latent capacity remains, but the definite association of certain actions with particular objects or experiences is probably handed down by tradition rather than by heredity.



Fig. 121. Young Cowbird and nest of Magnolia Warbler in which it was reared.



Fig. 122. Young Cowbird comfortably filling the nest of its foster parent, whose children it smothered: fearless, though nearly ready to fly.

CHAPTER XIV.

TAMING WILD BIRDS WITHOUT A CAGE.

MANY illustrations could be given of birds which in most parts of their range are wild or shy while in others they are very tame, and the same principle underlies them all. Wildness is due to fear which is partly inherited and partly learned by experience with this wicked world. Tameness, on the other hand, comes with the casting out of fear, and may be brought about by the formation of new habits which are either spontaneous or forced.

The House Sparrows of the Tuileries, and the pious Stork of Holland, Germany and France, are familiar examples of birds whose near or remote ancestors are shy and wary. The Stork is said to be excessively wild in the woods and marshes, yet it comes with confidence to the village and town, builds its nests upon house tops and steeples, and struts about the streets and door-yards in search of food.

It would be interesting to know how long the Doves of Venice have enjoyed the freedom of the Piazza del Marco. They are probably the best fed pigeons in the world, and few hours pass in the course of the day when their guardian, the vendor of sacks of corn, is not surrounded by his flock. They will alight all over you, and take the grain from hand or mouth. The Pigeon, it is true, has been long domesticated and responds more readily to friendly influences than the wild stock from which it has sprung.

Strange and possibly true stories are told of persons who have won the confidence of beast or bird. The wild bird responds to their call and the quadruped comes forth from his den and takes food from their hand. Such persons are popularly supposed to possess a mysterious power of fascination or a superior knowledge of woodcraft, but all this belongs in the catalogue of vulgar errors. It depends less upon the individuality of the person than that of the animal. Individual variation knows hardly a limit, whether in man or beast. Some birds are naturally tame and confiding, while their next door neighbors of the same kin and living in the same field may possess a temperament of such an opposite character as to baffle every attempt to dispel their fears.

The power of remaining motionless like a stone or stump in the woods is often enough to win the temporary confidence of both mammal and bird, and many will doubtless recall illustrations of this fact from their own experience. This suggests an early episode which impressed itself rather strongly at the time. With raised fishing-pole in hand I was sitting quietly by the river, possibly watching the common sunfish or bream standing guard over their nests, which they defend with such fiery pugnacity, when I suddenly had a "bite." Looking up, I saw a Kingbird comfortably perched on the end of my rod. He doubtless had a nest in the alders close by.

It is easy to conceive a state in which all animals would be tame, but it would not be the state of nature known to us which has developed under the laws of battle, the survival of the strongest, the wariest, the best protected or concealed, or the most intelligent. The higher animals either prey on one another or on the helpless invertebrates, or are preyed upon, and with most, tameness would soon lead to extinction. Wildness or wariness is not only the law of their nature, but the very condition of their existence. The animal which fails to profit by experience, or at least to the extent of learning caution, and thus displaying the rudiments of intelligence, must go to the wall, unless the conditions of its life are exceptional or nature grants it some extraordinary favor such as protective or deceptive coloring.



Fig. 123. Male standing at nest after having fed his young. Notice the characteristic instinctive pose of one of the fledglings.

While most animals are wild in the state of nature and many are almost untamable, a comparatively large number submit to the taming process, and a few become tame in the natural state. The principle of the survival of the strongest or the fittest as a result of the struggle for existence is so general and so primitive that when we find animals already tame in nature, we must regard them as the descendants of wild ancestors.

As a rule no wild beast or bird approaches man without some inducement. Unless some other instinct be aroused, it comes, if at all, to defend or feed its offspring, to appease its hunger, or in very rare cases to find protection from danger. The taming process depends, as we have just seen, upon the ability to form new associations and may be brought about artificially by restraint as when a wild animal is caged and new habits are, as it were, forced upon it, or by means of strong lures. Of the latter, one of the best is food in the presence of hunger, but the strongest of all are the young at a certain stage of growth. In order to tame a wild animal without recourse to restraint

there must be some means of breaking the ice, or beginning a course of instruction, by chaining it to a fixed point. In case of birds with young the invisible chain is parental instinct, which inhibits fear and holds the animal to a given spot. We will attempt to analyze the taming process by the use of food and young birds as lures, and finally consider the similar experiments which nature occasionally conducts independently and on a larger scale.

I throw some cracked corn out of my window, and it is soon discovered by the ubiquitous Sparrows. When they see me standing behind the pane they are afraid to approach, but they are also hungry. At last the impulse to get the food overcomes their fears, and they are rewarded by the feeling of pleasure and satisfaction. When they come repeatedly, each time reaping a reward without evil consequences, a new habit is gradually formed by the repetition of the act. The pleasure of getting food is gradually associated with flying to a certain spot in the presence of objects which in the course of time become familiar. If the contrary impulse, due in this case to hunger, is sufficiently strong, the process may be carried forward step by step until the birds come to the hand for food. With the gregarious Sparrow, however, life in a populous town is usually too complicated to admit of carrying out the experiment with success in any reasonable time.



Fig. 124. Female Robin in act of nest-cleaning. She approaches at the back. See Chapter XII.

There are many species which respond more rapidly than the wily Sparrow. Of these, I will mention the Chickadee, Nuthatch, Canada Jay, and Goose. The Chickadee has to work harder for a living in winter than the Sparrow, is far less gregarious and wary by nature, and is seemingly endowed with a keen sense of curiosity. Mr. Chapman thus speaks of the behavior of some of these birds in Central Park, New York City, in February: "they would often flutter before one's face and plainly give expression to their desire for food, which they took from one's hand without the slightest evidence of fear. Sometimes they even remained to pick the nut from a shell while perched on

one's finger."[1] They become equally tame when hard pressed by hunger in the remote woods, and I have no doubt that the following account which was given to me by a man who worked at a woodchopper's camp in New Hampshire during the winter is strictly true. He said that at meal times the Chickadees would come about and pick up any crumbs that were left over or were thrown to them, and that they soon became so bold as to alight on the hand, or hat, and even to take pieces of bread from the mouth; that he would often amuse himself by trying to "close over them" with his hand, and that while they were usually too quick for him, he had caught them in this manner.

Early in the winter of 1899, a Red-breasted Nuthatch formed the habit of going to a certain yard in Jefferson, Ohio, for food.[2] At first it stayed among the trees like the Brown Creepers, but at length came to the window-sill for scraps of suet which were placed there. This window happened to be opposite a pump and sink, but the Nuthatch soon showed no fear even when one stood close by and worked the pump. Blue Jays, Downy and Hairy Woodpeckers, Chickadees, and English Sparrows also came to the garden for food. After several weeks of this kind of treatment Mr. Sim went outside, placed some suet on his palm and rested his hand on the window-sill. The Nuthatch came to the lure, picked up a piece of the food, and apparently tried to hide it between his thumb and finger. After the Red-breasted Nuthatch departed a Whitebreast came down, helped himself to the suet and was off. After this the Nuthatches often came and alighted on somebody's hand, head, or shoulder, but the Redbreast was much the tamest. When she was up in the big elm tree, she would swoop down at call, not touching a twig between her lofty perch and the hand. Hickory nuts were offered and preferred to the suet, but the seeds of the Norway spruce were still more to her taste. She would fly to a branch with a seed, rub off its wing, and after placing it in a suitable notch or crack, eat it leisurely. The Red-breasted Nuthatch would drink from a dish held in the hand, would take the proffered food while perched near the ground, and once even settled down in the hand as if going to sleep.



Fig. 125 Female Red-eyed Vireo feeding young. In these birds the behavior was perfectly free after the first day of study.

These birds were seen to eat snow, and Chickadees would frequently cling to an icicle on the roof and catch the drops of water as they fell from a shorter icicle near by.

[1] *Bird Studies with a Camera*, p. 49.

[2] For this account I am indebted to Mr. Robert J. Sim of Jefferson, Ohio.

Three or four Downy and Hairy Woodpeckers came to the window-sill, and would sometimes peck the fingers of persons feeding them. The Brown Creeper was far more cautious, and never came to the hand.

The familiarity of the Canada Jay or Meat Bird is known to everybody who has hunted or camped in the northern woods; its fear is allayed by hunger even more promptly than in Chickadees and Nuthatches. Audubon says of these birds that "when their appetite is satisfied, they become shy, and are in the habit of hiding themselves among close woods or thickets; but when hungry they show no alarm at the approach of man." While his friend was fishing in a canoe on one of the Maine lakes in the summer of 1833, "the Jays were so fearless as to alight in one end of his bark, while he sat in the other, and help themselves to his bait. . . . The lumberers or woodcutters of this state, . . . frequently amuse themselves in their camp during the eating hour with what they call 'transporting the carrion bird.' This is done by cutting a pole eight or ten feet in length, and balancing it on the sill of their hut, the end outside of the entrance being baited with a piece of flesh of any kind. Immediately on seeing the tempting morsel, the Jays alight on it, and while they are busily engaged in devouring it, the woodcutter gives a smart blow to the end of the pole within the hut, which seldom fails to drive the birds high in the air, and not infrequently kills them. They even enter the camps and would fain eat from the hands of the men while at their meals."



Fig. 126. Male Red-eyed Vireo prepared to inspect and clean nest. Notice that in this series—Figs. 50–57, 125—the birds uniformly occupy the same perch. Detail of bird shown in Fig. 49.

Possibly no bird has keener vision or sharper ears than the Canada Goose, which in its wild state is said to be vigilant, suspicious, and hard to be surprised, yet it is often easily and quickly tamed. There are in Cleveland nearly forty of these geese, which are descended from a smaller number introduced about twenty-five years ago. Their migratory impulse has been completely lost, and their sense of fear subdued, but their other wild instincts remain. They live mostly in the parks, going from one to another as the spirit moves them, and breed on the small artificial islands in artificial ponds. I sometimes hear their *honk!* as they fly over the city at night or in early morning, and see their "harrow" or "triangle" which plows the air by day often within bow-shot from Euclid Avenue.

When the birds are feeding on a lawn you can walk among them and drive them like a flock of tame geese, but they hate dogs and take to wing or water the moment one

is seen to approach. They once had the habit of alighting on the roof of a tall building near Wade Park, but after one of their number met with the mishap of falling down a ventilating shaft this practice seems to have been abandoned.

Audubon speaks of a pair of geese which bred for three years near the mouth of the Green River in Kentucky,[1] and of his experience in feeding them at the nest. The male was at first very pugnacious, and once dealt him such a blow on the arm that he thought it was broken. In the course of a week both birds would take the proffered corn, but never allowed him to touch them. "Whenever I attempted this," says Audubon, "the male met my fingers with his bill, and bit me so severely that I gave it up." Later he trapped the entire family of eleven, pinioned them and turned them loose in his garden. He kept the whole flock three years. The old birds did not breed again, but two pairs of the young reared new broods.

On one of his shooting excursions Audubon shot a wild goose, and on his return sent it to the kitchen to be prepared for the table. The cook brought him an egg ready to be laid. This was placed under a hen, and in due time produced a bird, which became very gentle and would feed from the hand. When two years old it mated with a male and reared a family.

We have seen how fear may vanish before the surge of the parental impulse which impels a bird to seek, nourish, and defend its offspring, even at the risk of life itself, and will now consider how this instinct may be used in taming wild birds at the nest and in bringing them to the hand.

If young birds of those species in which the parental instincts are very strong, are taken from the nest when nearly ready to fly, the old birds, especially if they be among the class of tamer individuals, may be brought direct to the hand in a short space of time. To their excited vision men are as walking trees. Their attention is riveted on the young, and the man is nothing to them, providing he remains quiet, or moves about with caution. Whatever fear remains is blocked by the stronger instinct to go to their young.

Every occasion on which the tent described in these pages is brought up to a nest of young birds is a direct experiment in the taming process. No matter how far the discipline is carried or how little permanency it may possess, the principle is always the same. By this method wild birds, while the parental instincts are at their height, can be tamed to a degree without use of a cage. In illustration of the process, we will select the Robin and Chestnut-sided Warbler, although the experiments to be described were not carried out with this end especially in view. In any case parental instinct is the chief agent employed.

The Robins now referred to have served so often in these pages as a text for the illustration of habit and instinct that I need only say that they nested high in an oak tree in some woods, and that the entire branch with the nest was carried to a perfectly bare field on July 25th, when the young were a week old. At this new site the young passed another week, taking their first flight at noon on the last day of the month. I was encamped beside them for parts of six days, and spent altogether twenty-four hours at their nest. Although the familiar Robin is usually an easy mark for the bird-photographer, this particular pair were extremely wary. They showed a bold front when openly assailed,

[1] *Ornithological Biography*, vol. iii., pp. 8, 9.

but succumbed to fear completely, the moment the tent was closed, and refused to approach the nest. On the second day the female was on the nesting bough in ten minutes, but hesitated and made seven consecutive visits before actually feeding the young. After several hours their fear had become so well subdued that the wary male brought and delivered food while I was engaged in taking down the tent and stood close by. On the third day the young were fed while the tent was going up, but a full half hour had elapsed before their behavior was perfectly free and spontaneous. On the fourth day the birds came as before, and life at the nest was resumed with perfect confidence after the space of twenty minutes. The female would now sit placidly on the nest in face of the tent and the window in its front, across which the hand was frequently drawn to adjust the shutter that was clicking at random intervals but twenty-eight inches from her ears.

At the close of the day's observations, I took the camera outside the tent, and photographed the male as he came to the nest. The moment I entered the tent to take it down he was back again with a mouth full of cherries. When after striking the tent and rolling it up I stood quietly by the nest for a few moments, the cock came for the third time and delivered a large grasshopper to his never-to-be-satisfied brood.

On the first day four hours failed to bring these birds to their needy children, while in the ninth and last the male, the more suspicious of the two, was on hand with food in seven minutes. With the new objects in constant view, new associations had been formed. The strong parental instinct supported by habit had banished most of their former fear. The first steps in the taming process had been taken, and were carried further in the case now to be described.

Two nests of the Chestnut-sided Warbler, each containing fresh eggs, were found in a pasture on the twelfth day of June. The behavior of the birds at both nests was at first essentially the same, so far as it was tested. While the eggs were still fresh, the nests were often visited without seeing or hearing a bird, but during incubation the female, who is a close sitter, would allow me to approach within a yard or two feet. Then as I extended my hand slowly toward her she would hop out and cling with head down on the farther side of the nest, so that only her little tail was visible over its rim. Any one prone to discover protective mimicry in such cases would find a striking example of it in this attitude,—the little gray tail of the bird simulating so well one of the twigs which helped to support the gray wall of the nest. It was rather the case of an alert animal lying still or in hiding until a present danger might be past. If you kept your position long enough the bird would drop to the ground, where joined by her mate, both would hop about in the grass *chipping* nervously, but keeping well out of sight. On approaching one of the nests still later when there were young, the female was usually overtaken in the act of brooding. At such times it was easy to walk slowly up and place your hand close to the brooding bird. But before allowing you actually to touch her, she would flit to the grass, and with spread wings and tail practice that "art of feigning" as it is usually called, although it is not an art or anything learned or practiced for the occasion, but an inherited instinct, the end and advantage of which is to distract your attention from the nest to the moving bird. One day I stood by and watched the little mother to see how long her antics would last. She would come within a yard of my feet when I remained perfectly quiet, and trail her wings along the ground, making repeated sallies

back and forth, flying only when close pressed, and then always away from her nest. On one occasion this was kept up from ten to fifteen minutes, and did not cease until I withdrew.

My experiments at the first nest were begun on June 12th, by clearing away the bushes in front. The tent was set up two feet away on the morning of the 15th, while the little hen was still sitting over the eggs. She would dart out of the nest, return and take a peep inside, sit for a few minutes and be off. When all was quiet she could be seen jumping in and out repeatedly, as if equally uncomfortable whether away from her treasures or hugging them close. In the course of half an hour it was easy to photograph the sitting bird, who now paid little heed to the shutter, and remained undisturbed on the nest during my preparations for leaving.



Fig. 127. Offering grasshopper to a Chestnut-sided Warbler who has been tamed without use of a cage. It was possible to approach this bird and stroke her back with the hand, without giving alarm.

On the following day the old bird was still persistently sitting, and even allowed me to erect the tent close beside her without budging. When finally driven off by the hand, she uttered a few *tseeps* and returned in a moment. Once the male came, and as I supposed, placed an insect in the nest, when his mate, who stood close by, hopped to the brim, put down her head, and as I thought ate the food, but no, she was feeding the little ones, for she was now a mother. Four young birds, scarcely bigger than bumblebees, had just emerged from their shells. They must have been hatched since noon of the previous day.

On the third day these Warblers paid no attention to either the tent or the operator, and before going away I was able to touch the bird on the nest, though not without sending her off. The fourth day found their confidence undiminished, for the sitting bird eagerly seized a grasshopper which I offered from the hand stretched through the tent window. Four days later still I spent nearly seven hours with these Warblers, and in the afternoon began to test more systematically the strength of the intimacy which we had cultivated. Taking a long twig in the hand and reaching through the window in the front of the tent, I touched the old bird. She resented this but little and when her back was scratched seemed to like the sensation. Then I left the tent to look for insects, and

after a long search returned with a few small grasshoppers. When one of these was offered the bird would eye the squirming insect and try to seize it when held within reach. Wishing to economize, I held on to the insect and nearly pulled the bird off the nest.

After discarding the tent I was able to walk up to this bird and stroke her back with my hand without disturbing her in the least. Setting up the camera outside and attaching a tube with pneumatic bulb at the end, I made a number of photographs which show the Warbler sharply eying an insect and prepared to seize it when held a few inches away. It would have been an easy matter to take her in the hand, though possibly not without injury to the young. Their early flight from the nest cut short any further experiments, but what could not have been done with a bird who had become so tame and confiding in the course of a few days?



Fig 128. Chestnut-sided Warbler family. The male, perched above, has just delivered an insect to his mate, who quickly passed it to the young and continued to brood. The same nest is shown in Figs. 3, 11, 127, 129, and 130.

The foregoing account does not necessarily imply that a wild bird can be induced to remain docile in the presence of man for any great length of time while still enjoying the freedom of its wild life. If the lesson learned is to be a permanent acquisition, it must be often repeated, and no other teachers allowed to interfere. To effect this the animal must as a rule be placed under restraint or in a cage, where its experiences are more uniform, more limited and under perfect control.

In free life a new habit must struggle with other competitors and is liable to be suppressed quickly. However, I think it has been clearly shown that in the beginnings of the taming process which have been illustrated, where no physical restraint is used, the sense of fear must be combated by a stronger and contrary impulse, such as hunger or the parental instincts, which will lead the bird to undergo new experiences, and finally to adopt new habits.

Audubon has given an interesting account of some Phœbes or Pewees which nested in a cave on his plantation in Pennsylvania, and became the subject of some of his earliest studies and experiments in ornithology. It admirably illustrates the taming process under the spur of natural instinct.[1]

"On my first going into the cave," he says, "the male flew violently towards the entrance, snapped his bill sharply and repeatedly, accompanying this action with a tremulous

[1] *Ornithological Biography*, vol. ii., p. 122.

rolling note, the import of which I soon guessed. . . . Several days in succession I went to the spot, and saw with pleasure that as my visits increased in frequency, the birds became more familiarized to me, and, before a week had elapsed, the Pewees and myself were quite on terms of intimacy. It was now the tenth of April. . . . The Pewees, I observed, began working at their old nest. My presence no longer alarmed either of them." He was soon able to put his hand close to the sitting bird without disturbing it.

While possessed by the incubation spirit many birds, as is well known, are indifferent to danger and will hug their eggs at any cost. In this respect few can excel the "tame villagic fowl," who displays greater stupidity than most wild birds, who rarely sit on an empty nest,[1] and have been known to reject strange eggs. In this state birds cannot be considered tame although the sense of fear may be temporarily dulled, and one of the conditions of the taming process fulfilled. The hen will peck vigorously at the intruder, and if hustled off the nest will soon return. Some birds like Song Sparrows and Brown Thrushes will remain immovable as if hiding until you come dangerously near, when they glide off silently, but usually remain quiet for a moment only. The Robin flies off in a passion. The Tropic Bird fights but sticks to her egg. The Woodpeckers are close sitters and may sometimes be taken in the hand. A Chickadee which I worried with a straw would peck angrily at it, but remained on the nest. The Cedar-birds retire in silence. In this state birds become passive merely through the temporary suppression of the sense of fear.



Fig. 129. Female Chestnut-sided Warbler approaching nest and looking in. At this time there were eggs, or the young had barely pipped the shell.

Fish Hawks used to nest on Plum Island, New York, where according to Mr. C. S. Allen,[2] they had been zealously protected by the owner of the island for upwards of thirty years previous to 1885. The first nest shown to him by Mr. Jerome, the faithful guardian of the birds, was "fairly in his door-yard, close by his front gate, and only about fifty yards from his home. It was placed upon an old pile of fence rails, rotted to black mould in the center, but kept up by the yearly addition of fresh rails. Mr. Jerome said that to his knowledge this nest had been occupied every year for forty years." It had been added to yearly until its huge bulk of sticks and miscellaneous materials would

[1] For an account of a pair of Bald Eagles nesting on the ground in the New York Zoölogical Park and incubating a good-sized stone which was placed in the improvised nest, see *Bird Lore*, vol. iii., p. 34. 1901.

[2] *The Auk*, vol. ix., p. 313, 1892

make three cart loads. It was but seven or eight feet from the ground, so that by stepping on a projecting rail the beautifully spotted eggs within could be seen. "Mr. Jerome could pass close to the pile of rails without the birds leaving the nest, while I could not get nearer than thirty or forty feet." At other places on the island, the birds would alight on one nest while he was examining another near by. This illustrates how a shy bird may become relatively tame during the breeding season, and shows clearly how some learn to discriminate.

That many birds become tame in a state of nature is well known and the subject is full of interest. The Pine Grosbeak is as good an illustration of the fact as may be found in this part of the world. Pine Grosbeaks make their summer home in the vast forests of evergreens which cover the continent from Labrador to Alaska. A few, it is said, have been found breeding in latitude 47° in New Brunswick, and they have even been recorded in summer on Mt. LaFayette, New Hampshire. They are irregular winter visitors to the Northern States, sometimes going so far south as Maryland and Kansas. In the winter of 1884, they were very common at Holderness, New Hampshire, beginning to appear in small flocks about the middle of February and finally disappearing after the eighteenth of March. At first they were tame and could be approached without difficulty, while later they became shy and timid. They frequented the white pines, on the buds of which they fed, but occasionally came into the open, and sang loud and merrily.



Fig. 130. Female Chestnut-sided Warbler inspecting her young after having served food.

I remember meeting a flock of these plump, stalwart looking birds in a grove of sapling pines on the last day of February. The woods on every side were hoary with snow which had been falling for hours. When a young pine drooping under its weight of snow suddenly blossomed with a bright company of these birds, you might travel far to find a more attractive winter picture. A bird would sometimes drop on a branch, and settle down as if going to sleep. Then suddenly aroused by the desire for food he would sidle to the end of the bough, pick out the terminal or largest bud, twirl it between his stout cone-shaped mandibles to get rid of the scales and then swallow the resinous morsel. After seeing this experiment performed a good many times, I selected a handsome male, walked up to him, and caught him with my hat, as if he were a butterfly. When I stooped to pick him off the snow, he squeaked and struck violently with his beak, uttering a peculiar *car-r-r-r-r!* When placed on the snow again he flapped about for a few moments resisting every attempt to take him, and finally rose

and disappeared among the snow-laden trees. There were about fifty birds in this flock and the grove resounded with their clear whistled notes. They were easily approached at all times and in all weathers, during the early weeks of their visit, agreeing in this respect with the Bohemian Waxwing, the Arctic representative of the Cedar-bird. Two small flocks of these birds visited Burlington, Vermont, November 24 and January 21, 1882. A low plaintive call-note first attracted my attention, when a party of eight of these fine birds came into view. They were leisurely preening their feathers on the lower branches of a red cedar tree. When close upon them, they paid no attention, and finally wishing to see them fly, I had almost to shake them from the branches. They went off in a compact body like their smaller relative, giving a "*zee, zee, zee-ze!*" call-note.

Audubon speaks of the familiarity of Crossbills which he observed while on a moose hunt in the summer of 1833. They alighted on his head, showing no fear, and five or six were caught at one time under a snowshoe.[1]

This tameness found among many Arctic species has been met with on a much wider scale in remote oceanic islands, where man is almost unknown and where the conditions of life are very different from those of the mainland. The inhabitants of the Galapagos Islands, which lie under the equator between five and six hundred miles from the west coast of South America, offer a most striking example of this anomaly. Their natural history which has been told in one of Darwin's interesting chapters, first led him to reflect on the origin of species.[2] He says that many of the animals and plants are aboriginal, and found nowhere else, that "there is even a difference between the inhabitants of the different islands; yet all show a marked relationship with those of America. . . . The archipelago is a little world within itself, or rather a satellite attached to America, whence it has derived a few stray colonists, and has received the general character of its indigenous productions." He found twenty-six species of land birds, all peculiar to the islands excepting only one, the Bobolink, whose summer range extends as far north as Labrador.

All the common terrestrial birds of these volcanic islands were very tame, and all says Darwin, "often approached sufficiently near to be killed with a switch, and sometimes, as I myself tried, with a cap or hat. A gun is here almost superfluous; for with the muzzle I pushed a hawk off the branch of a tree. One day whilst lying down, a mocking-thrush alighted on the edge of a pitcher, made of the shell of a tortoise, which I held in my hand, and began very quickly to sip the water; it allowed me to lift it from the ground whilst seated on the vessel: I often tried, and very nearly succeeded in catching these birds by their legs.

"These birds, although now still more persecuted, do not readily become wild: in Charles Island, which had then been colonized about six years, I saw a boy sitting by a well with a switch in his hand, with which he killed the doves and finches as they came to drink. He had already procured a little heap of them for his dinner; and he said that he had constantly been in the habit of waiting by this well for the same purpose."

Darwin remarks that the most anomalous fact on this subject which he had met was the wildness of certain small birds in the Arctic portions of North America, while some of the same species were said to be tame in their winter quarters in the United States.

[1] *Ornithological Biography*, vol. ii., p. 436.

[2] *Journal of Researches*, Chapter XVII.

"How strange it is," says he, "that the English wood-pigeon, generally so wild a bird, should very frequently rear its young in shrubberies close to houses!"

Respecting the wildness which birds exhibit towards man, Darwin could find no way of accounting for it except as inherited habit, but in another work, he thus refers to the same subject[1]: "If we look to successive generations, or to the race, there is no doubt that birds and other animals gradually both acquire and lose caution in relation to man and other enemies; and this caution is certainly in chief part an inherited habit or instinct, but in part the result of individual experience."

The observations which have been made on the behavior of old and young birds do not support any theory of the inheritance of habits to account for tameness in animals, but as already shown afford a better clue of how this has been brought about. Let us go back to the Pine Grosbeak which, when fresh from his sub-Arctic home, can be approached and caught with your hat as could many of the birds in the Galapagos Islands when Darwin visited them in 1835. So far as I know, no one has studied the young of this species in the nest and ascertained whether they show the same instincts of fear in general toward strange sights and sounds, as we find in passerine birds nesting farther south. Assuming that they do, and there can be little doubt of it, the instinct has lapsed through disuse in adult life, although the capacity of expressing fear remains and may be quickly aroused and directed towards particular objects. The timidity of this bird in March after a brief experience with the ways of men is therefore virtually an acquired character, and there is no evidence that it is handed down by inheritance.

The breeding range of many northern birds covers a vast area, and in different sections there is reason to expect much variation in the habits of the same species. The timidity of the Arctic birds referred to may have been due to local conditions affecting a relatively small number, or the birds may have been young individuals whose intuitive fear had not been worn away, or old ones possessed of a wisdom derived from extensive travel southward. Among birds which are reputed to be shy, tamer individuals are to be found, and many acquire the habit of nesting in gardens and often close to houses. In the Galapagos Islands, where birds had lived in comparative security for ages with no fierce and relentless enemies to mar their tranquillity, the instinct of fear had not only lapsed, but the power of forming new habits had weakened. It is therefore not surprising that they should be slow in acquiring a fear of man, but any animal which finally fails in the face of constant persecution to profit by experience has touched the lowest depths of stupidity, and its days are numbered.

[1] *The Descent of Man*, p. 80.



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